



Orbit

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Roger Hill, Editor

Last month I asked you to consider contributing a few hours per month to help out the Hamilton Centre by sitting on the Board. A couple of people came forward, and have submitted nomination forms, which is great, and they will be made most welcome. We could use a couple more, however.

It does not matter how much, or how little, experience you have with organizations. It does not matter how much, or how little knowledge you have with astronomy. In fact, it is precisely those who have little experience that I've found can make the biggest difference. Often, it is the challenging of justifying why we should continue doing things the way we have always done them, that forces us to look freshly at what the Hamilton Centre is and what it does.

For instance, a few years ago, we had a bit of difficulty getting the entire Board out for meetings, so we tried holding the Board meetings before the regular meetings. This was also a hope to try to get the meetings to go faster as, at the time, they went on for far too long. We also hoped that some regular members would show up early and learn what being on the Board was all about. This worked, in some ways, as it showed us how to be a bit more disciplined in running meetings, and we ended up with a couple of people who offered to volunteer the next time there was a vacancy. We tried moving the meetings to a Sunday afternoon, particularly if there was something contentious to discuss, to allow full and complete debate.

The point is that the Board will frequently alter itself, or its practices, to allow the greatest possible contribution of the members.

There is one problem at the moment that we have been unable to find a solution for and that is that we have a student member who would love to be on the Board. However, neither Ontario law nor federal law allow someone under the age of 18 to be legally responsible. It is a situation I faced many years ago, and I would have had to wait even longer, but the age of majority was reduced to 18 just in time.

So, thanks for those who have come forward, and for the rest of you, how do I convince you to climb aboard?

This issue of Orbit sees me complete five years of editing Orbit. Frankly, it was a post I never thought I'd fill, but I must admit I'm having more fun doing this than any other position I've held on the Board over the years. And while Orbit Editor has traditionally been a Board position, this is not necessarily the case.

Is five years in the one position too long? I don't know...historically, Editors have lasted about two years, but in many ways my predecessors did not have the advantages that I've got, of things like desktop publishing software, and the ability to find great source material without having to re-type it. Prior to about 1995, Orbit was produced by a committee of people with the Editor being the person in charge. Once we went to electronic distribution, though, life got a lot easier, and it became possible for one individual produce our newsletter. It does take some dedication, though, and I'm proud to say that in the 50 issues that I've produced, I've only been late once. So, let me make this offer, down here at the bottom of the page (where no-one is reading anyway): If there is someone who would like to take over editing Orbit, let me know, otherwise, I'll volunteer to do it for another year.

If you have any ideas of improvements to Orbit, or things you would like to see in these pages, let me know, and I'll do what I can to provide them...assuming that I'm still Editor, of course!

Until next month (maybe),

Roger Hill

Presidents Message—Andy Blanchard

As we head into elections this Thursday, I ask you to reflect on how far we have come in the last year as a club? The new friends we have made, and the reappearance of old ones. Look at how your board has matured and what they have achieved! When you see a board member wearing their bronze star, take the opportunity to say thank-you or even how can I help?

I have watched my fellow board members reaching deep into their personal time, to create a great experience for the membership. The number of new members in this last year is simply unbelievable. I am sure largely due to the number of fun events and programs that the clubs has hosted this last year. If you have forgotten just how busy the year was, then I suggest you read Gary Colwell's excellent outreach report which in my opinion covers it all very well.

Enough about the board, its time to hear from you. If you like what we are doing and want us to continue, then let us know by coming out to the Annual General Meeting (AGM) and cast a vote. A great way to say you support us and you want us to continue on.

In closing I had the honour of represent RASC Hamilton at Neil Armstrong's memorial on Sept 13th in Washington D.C. I wrote about it in Orbit this month, if you have any questions, I would be happy to share more about what happened.

Andy Blanchard
President RASC Hamilton
atacamandy@hotmail.ca

Outreach Directors Report—Gary Colwell

2011-2012 has been an awesome year for outreach. I want to thank everyone who has helped with this endeavour, and extend the invitation to those who may want to help...let me know!

Some of the events that were part of our outreach programs were:

Sidewalk Astronomy

Armchair Astronomy

Astrophotography seminars

Smackdowns

Astrocasm (although delayed till 2013)

Summer Banquet

Scout Cuborees and Scout camp outreach

Westfield Outreach

Public Nights

David Dunlap Observatory Nights

McCallion Planetarium

...plus all the adhoc trips to the observatory for “spur of the moment” observing sessions.

Outreach Report (Cont'd)

With the loss of Spencer Smith Park as our primary location for sidewalk astronomy, we are in the process of finding a new venue for this event. High traffic areas are the best, but we have been looking into the possibility of conducting these in local mall areas or areas that have a high volume of pedestrian traffic.....any suggestions for a suitable spot would be welcomed!

Armchair astronomy is moving forward with interesting topics such as the latest discussion on how to put an object into low earth orbit....a possible club project?

Astrophotography continues to be a wonderful outreach, seeing many new members coming out to learn the fundamentals of astrophotography. At the latest held September 27, 2012 at the observatory, many people for the very first time imaged the moon with spectacular results!

Get ready for the Fall Smackdown....to be held in October 2012....more to come. This is an event where members and guests alike are asked to put their scopes on a head to head friendly competition to see who has the best scope! Of course refractors always win....lol....

Planning for our first annual AstroCASM event was proceeding very well, when the venue we were going to hold the event at had a catastrophic explosion that compromised the structural integrity of the building, thus forcing the untimely cancellation of the event. After quick scrambling, a new venue was found for our banquet with only a few weeks to go and our Annual Banquet was a huge success!!

2011-2012 saw a big influx in outreach programs to young boys and girls. Through scouts, several "observing and Astronomy Badge programs were put on including a Cuboree at Binbrook CA and at a conservation area in Dunville ON. Several hundred boys and girls were treated to the night skies by members of the Hamilton Centre. Scout groups are encouraged to take out a membership in the centre to take full advantage of all the programs offered.

Westfield continues to be a wonderful opportunity for the centre to promote astronomy. With the careful direction of Mark Pickett, developing this venue in the upcoming year will be an ongoing project for the Centre.

Public Nights have been a huge hit!...Many new families have been introduced to the hobby of astronomy. A more structured approach to these evenings will be explored and developed to make this experience and even better one for all.

And who can forget our trips to the DDO!....this has been an opportunity not only for our own club...but for fellow clubs as well!.

And finally the MCallion Planetarium was also another outreach program for our members. Having a personal presentation on the stars given to our members and potential members was a great evening for all...Another will be planned for the near future.

In the upcoming year, more of these events are being planned, but we need your help in making them a success.. Volunteering and helping out is a great way!.

Also in the works is a "Messier Marathon" where we will be attempting to view all of the Messier objects. I have produced star charts with Telrad circles to help identify and find them all. The Charts can be downloaded from our website for free.

I am looking forward to a very exiting new season....I hope you are too!

Gary Colwell
Outreach Director
Hamilton Centre RASC

Communications Report—Gary Bennett

Website Refresh

Our website will be undergoing a facelift in next few months thanks to the efforts of Shawn Preston who will be taking over my duties as “webmaster”. We are coming up on the 2 year mark since our website had its last overhaul and we are hoping to add some nice new features along with a new look. At the top of the new features list is a photo album where members can post their own photos.

Observatory Equipment Instruction Guide

At long last, we now have a proper instruction manual for the club’s fancy telescope and mount! Those of you who had the formal training know that the big telescope doesn’t have any operable controls, but Paramount ME sure does! How many of you remember how to get it running?

It was a big project but we now have a formal document, with lots of photos and computer “screen shots” that takes you step-by-step through the entire procedure of start-up and shut-down. It is a 16 page guide (mostly photos and screen-shots) that can also serve as a training manual. For our more experienced members there is also a short 3-page “Quick Reference Guide” that is now attached to the mount for easy reference.

You can find these new documents in several places:

- The full instruction manual is kept in the observatory in a moisture resistant binder.

- The Quick Reference Guide is attached to the mount (it hangs from a chain)

- Electronic Copies are available on our on-line bulletin board (forum.hamiltonrasc.ca). They are posted as a topic under: Hamilton and Area/Equipment. If you haven’t signed up for the bulletin board yet, now would be a good time!!

Doing Science with a Spacecraft’s Signal—David Doody

Mariner 2 to Venus, the first interplanetary flight, was launched August 27 fifty years ago. This was a time when scientists were first learning that Venus might not harbor jungles under its thick atmosphere after all. A Russian scientist had discovered that atmosphere during the rare Venus transit of 1761, because of the effects of sunlight from behind.

Mariner 2 proved interplanetary flight was possible, and our ability to take close-up images of other planets would be richly rewarding in scientific return. But it also meant we could use the spacecraft itself as a “light” source, planting it behind an object of our choosing and making direct measurements. Mariner 4 did the first occultation experiment of this sort when it passed behind Mars as seen from Earth in July 1965. But, instead of visible light from the Sun, this occultation experiment used the spacecraft’s approximately 2-GHz radio signal.

The Mariner 4 experiment revealed Mars’ thin atmosphere. Since then, successful radio science occultation experiments have been conducted at every planet and many large moons. And another one is on schedule to investigate Pluto and its companion Charon, when the New Horizons spacecraft flies by in July 2015. Also, during that flyby, a different kind of radio science experiment will investigate the gravitational field. The most recent radio science occultation experiment took place September 2, 2012, when the Cassini spacecraft carried its three transmitters behind Saturn. These three different frequencies are all kept precisely “in tune” with one another, based on a reference frequency sent from Earth. Compared to observations of the free space for calibration just before ingress to occultation, the experiment makes it possible to tease out a wide variety of components in Saturn’s ionosphere and atmosphere.

Occultation experiments comprise only one of many categories of radio science experiments. Others include tests of General Relativity, studying the solar corona, mapping gravity fields, determining mass, and more. They all rely on NASA’s Deep Space Network to capture the signals, which are then archived and studied.

Find out more about spacecraft science experiments in “Basics of Space Flight,” a website and book by this author, <http://www2.jpl.nasa.gov/basics>. Kids can learn all about NASA’s Deep Space Network by playing the “Uplink-Downlink” game at <http://spaceplace.nasa.gov/dsn-game>.

Observatory Report (and a Call for Volunteers)—Jason Blane

As many of you may have noticed there have been several projects undertaken and still in progress at the observatory. At this time, we would like to ask for member volunteers to assist in completing these projects for the fall season. If you are able to assist in any way with any of these projects, please let the newly elected Board of Directors know which weekend (s) you are available from the selection below. The weekends that we are looking for help are Saturday October 13th and the following Saturday, October 20th - time to commence is hopefully around 11am to?? (As long as we can be here).

Also, some items we are looking for and hope that members may know of people getting rid of them (for free) are:

Patio stones - preferably 2 by 2 1/2 foot stones, but any size will be useable - prefer not chipped
Any extra screening left over (to go under patio stones)

Projects that need to be completed are:

1. Finish cutting the tree logs (already cut down - need to be cut into sizeable pieces and put at the roadway for people to take for firewood.
2. Provided that patio stones and screening is available, relaying a proper walkway from the telescope building to the main building.
3. If enough patio stones can be found, laying an area for the barbecue to rest on properly.
4. One more coat of paint on the telescope building exterior door (just that door)
5. Any final spraying and knock down of dead bees nests in the butler/on the buildings.
6. Provided that the kick plates for the doors are available, installation of them onto the main building door and the telescope building
7. We have obtained a proper step for the outhouse entry - the current blocks need to be removed, the ground leveled, some screening applied and the step put in.
8. Cleaning of the outhouse (could use a seasonal "wipe down" inside - as well as sweep out) - there will be a Rubbermaid container put in the outhouse for storage of toilet paper - please make sure that it is closed properly as we have been having a huge problem with mice eating/shredding the toilet paper and none is available when needed - hopefully this might work.
9. One last cut of the grass - lawnmowers needed - (hopefully only one cut)
10. Cut back of the tree branches from the main driveway (overgrowing the driveway right now)
11. An overall cleaning of the interior of the main building and observatory - (e.g. sweep, dust, garbage removal, etc.)

Tools that will be required on these days:

- Lawn mower
- Gloves
- Tree cutter (loppers for branches - there was a chain saw donated to the observatory)
- Cleaning supplies, broom.

Please let Jason know if you can help out.

RASC Book Review by Joseph Pipitone

The Day the World Discovered the Sun: An Extraordinary Story of Scientific Adventure and the Race to Track the Transit of Venus by Mark Anderson, Da Capo Press, 2012. Boston Mass.

The recent excitement of the transit of Venus was a once in a lifetime spectacle for club members and an opportunity to share our passion with our friends and the public at large. A similar excitement occurred on June 3, 1769 when the world's first international science experiment was conducted at over 31 worldwide sites in order to observe and measure the transit of Venus.

The data collected from this experiment resulted in a more precise determination of the physical dimensions of our solar system and specifically the distance of the Sun from Earth. The interest in the Venus transit was scientific, but also geopolitical since the data contributed to resolving the outstanding problem of determining longitude at sea. Before then, seafarer could not accurately tell where they were in the world and many lives continued to be lost at sea. Knowing where you were globally, any time at sea was vital for trading, exploring and acquiring new lands. Nations who were involved in solving the longitude problem hoped to become more economically and politically powerful. As a result, many nations had a stake in participating in this experiment irrespective of the significant material costs and human suffering that was required.

Mark Anderson is a writer and astrophysicist who combined his background to give a gripping account of the drama of the various scientific teams preparing for the trip and making it to their sites around the world to do their respective observations. The book is well researched and cited but also reads like a mystery novel. The reader feels as if they were a member of each team and can easily identify with their struggles and the difficulties that they had to endure to get to their observation site and back home.

This book is also full of historical and scientific information and ends with a nice technical appendix that clearly describes how the collective data was used to arrive at the distance between the earth and the sun. Anyone with a basic understanding of geometry and math can follow the reasoning in the calculations and will gain a deeper appreciation of how the transit of Venus contributed to our knowledge of the solar system and improved our navigation abilities.

I found the book a wonderful read but I was mildly frustrated with the narrative flow. Anderson's account jumps the drama of one team and to the events of another team and back again, and at times, I found this disorienting. In retrospect, I don't know how the book could have been written any better, as all the dramas had to converge for a one event in time. This book definitely puts a context on the transit of Venus that informs and enriches the transit experience. In any case, I can confirm that both the fiction and the science lover in me were well rewarded by reading this book. I think that this book will be worth reading well after the transit of Venus has long passed.

This book is now in our library for your reading pleasure.

2004 Transit of Venus image in H α , by Steve Barnes.



Pocket Sky Atlas Challenges for October—John Kulczycki

Sky and Telescope Magazine's "Pocket Sky Atlas" has found a place in the tool kit of many amateur astronomers. The convenient size makes it easy to use at the telescope without requiring a separate chart table. For urban astronomers, the charts are sufficient for the brighter stars visible under urban skies; the charts offer enough detail for star hops with telescopes or binoculars. When taking advantage of a dark sky location, the details of the charts allow for hours of wanderings per page depending on the size of the telescope and the skill of the operator.

These challenge objects are indexed to the star chart pages containing those objects. The idea is to have fun and perhaps expand your observing past the "usual suspects" that can be found because of past experiences. Seeing conditions may not allow finding these objects every night, but they should be visible at some point during the month.

The chill is in the air and the nights are getting longer, leaves are falling exposing new opportunities in viewing fields not available during summer. For early risers, Orion returns and M42 beckons.

Don't be spooked away from doing astronomy outreach: it is not as scary as it seems.

The last night of the month is a perfect night to gain some hands on experience by doing neighbourhood astronomy outreach. The moon and Jupiter are good early targets. A telescope set up near the front door of your home during Halloween is an excellent idea for neighbourhood outreach. Other suitable targets include M31 (page 3), M45 (page 15 also see close up chart "A" at the back of the atlas.) and the Double Cluster (page 13).

The challenge objects are indexed to the object on its star chart page.

Happy hunting.

Naked Eye:

- M45 (Open Cluster) Page13
Pleiades RA 03:47 Dec +24:07
- Algol (Eclipsing Binary, Beta Persei) Page 2.
RA 03:08 Dec +40:57 Is it as bright as last month?
- Alderamin (star), page71. Occasional North Pole star
RA 21:19 Dec 62:35
- Errai (star), page71. Occasional North Pole star
RA 23:39 Dec +77:38
- Alpheratz (star), page72. RA 00:08 Dec +29:05
- Matar (star), page72. RA 22:43 Dec +30:13
- Caph (star), page72. RA 00:09 Dec +59:09

Small Scopes and binoculars:

- Kemble's Cascade (asterism), Pages 11 and 13.
RA 04:08 DEC: +62:20
- M73 (asterism), Page 77.
RA 20:59 Dec -12:38
- M2 (Globular cluster), Page 77.
RA 21:33 Dec -00:49
- M15 (Globular Cluster), Page 75.
RA 21:30 Dec +12:10
- NGC 7448, Page 74.
RA 20:59 Dec -12:38

Larger Scopes:

- IC 405 (Emission/Reflection nebula), Page 12.
RA 05:16 Dec 34:28
- NGC 7457 (Galaxy), Page 74.
RA 23:01 Dec 30:09
- NGC 7626 and 7619 (Pair of elliptical galaxies), Page 74.
RA 23:21 Dec 08:13
- V509 (Star, potential supernova), Page 72.
RA 23:00 Dec 56:67

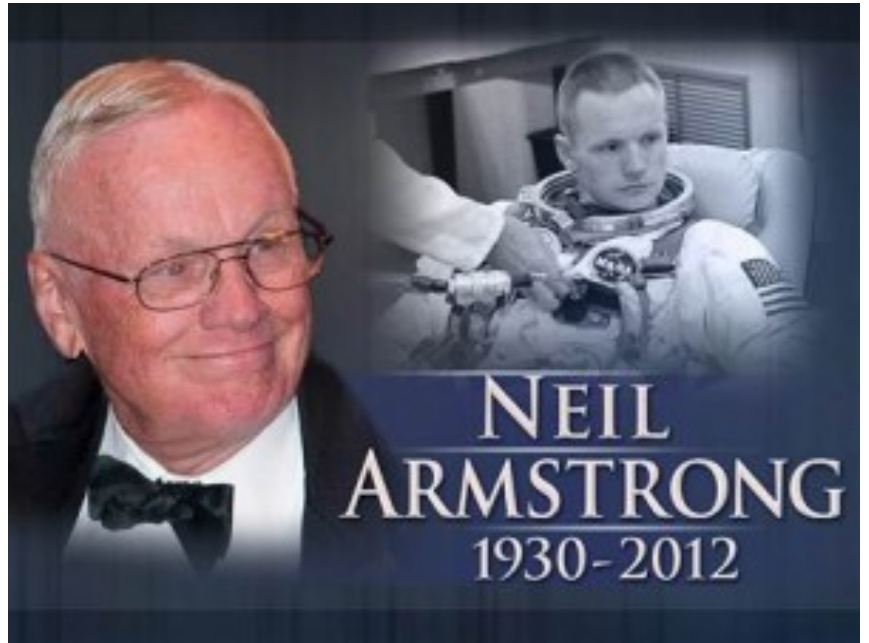
Bonus objects:

- NGC 7009 (Planetary Nebula), Page 77.
RA 21:04 Dec -11:22
- M30 (Barred spiral galaxy) Page 77.
RA 02:43 Dec -00:01
- M34 (Open cluster), Page 12.
RA 02:42 Dec 42:46
- PK 72-17.1 (Planetary nebula. Aka Abell 74), Page 75.
RA 21:17 Dec 24:09
- NGC 6940 (open cluster), Page 73.
RA 20:34 Dec 28:17

The Neil Armstrong Memorial—Andy Blanchard

On August 25th I was at my cottage, and like any other day at the cottage when I first heard the news of Neil Armstrong. Unlike 911 or the shuttle accident this was not a moment that will result in a life memory, but just the same I found myself profoundly saddened by the news. Neil Armstrong was to me a life model and my kind of hero. Often admired more for not only being the first soul to walk on another world, but as a humble man who shared his success with the other 400,000 people involved in the moon landing.

Mostly this sadness slid away over the next few weeks, and like the rest of the world I returned to my daily life. All that changed on Wednesday September 5th when I received an email from NASA asking if I would be interested in attending Neil Armstrong's memorial in Washington DC. Well my reaction was immediate and without hesitation and sent my request for a seat. By the following Wednesday I still had no reply and concluded that I must have replied too late.



I was completely surprised when the email arrived late that night when I was with my friends at the Hamilton observatory. A million reasons to go and only one day to prepare, client meetings to cancel and a RASC board meeting that same night that I called. After discussions with my friends they encouraged me to go and cancel all my meetings. By the time I got home I had made the decision that I would go.

Before going to bed I booked my plane flight for the next day, out to DC at 6 am and back on a 2:30 flight just in time for my RASC board meeting. All that was left was for my assistant to cancel my appointments for the day and set the alarm for 3:30am.

The next morning I was out the door and off to the airport. While driving I started coming to the realization of what I was doing and the gravity of the invitation and what I was about to experience.

Clearly last minute planning will and usually does lead to foul-ups. I arrived in Washington in time and found a shuttle to the National Cathedral. No traffic and the driver is zipping along fine for about 30 minutes, then we came to a complete halt, stopped dead. No problem the GPS tells us we have 60 minutes to spare and the service is at 10 am but my ticket will be release if I don't show up by 9:45. We patiently sat in traffic for far too long, now the GPS indicates it will be too close if the traffic does not begin to move soon. Unbelievable; I should have left last night...all this way and I won't be there in time.

I informed the driver of my dilemma and without hesitation we are in the service lane and off at the next exit, flying through side streets like the caped crusader. Everyone in the van was rooting on the driver and crossing their fingers for me to arrive on time. With about 2 minutes to spare they dropped me off in front of the Cathedral, and yes I gave the driver a big tip.

I thought I made it, but I still needed to find the NASA booth to pick up my pass and there were thousands of people between me and my goal. Not only were there several thousand attendees but double that in fans hoping to glimpse an astronaut or one of the many VIP's. Security was everywhere and as a fast moving guest without authorization, clearly I was attracting unwanted attention. I would not be surprised if one of the hundreds of cameras zoomed in on me as a person with nefarious intentions. I should not have been surprised when I was stopped and questioned as to my intentions, and instructed to get behind the lines with the other fans. After a panic explanation the secret service man escorted me to the NASA table. All I needed now was a SNAFU and my name would not be on the list. I actually had a fleeting thought of Gitmo, they confirmed me as an invited guest. I looked back at the SS guy and he was already returning to his post.

With my ticket in hand I walked up the stairs and into the Cathedral and my heart sank at the realization of having arrived so late that I was looking at several thousand people already seated and the service would completely unviewable from at the back. Just the same I slowly walked forward looking for that one lone seat that might be still available. To my amazement and delight not 10 rows from the front just under one of the news camera a spot was available, what luck. In fact there were two, which I quickly wasted no time and claimed one for himself.

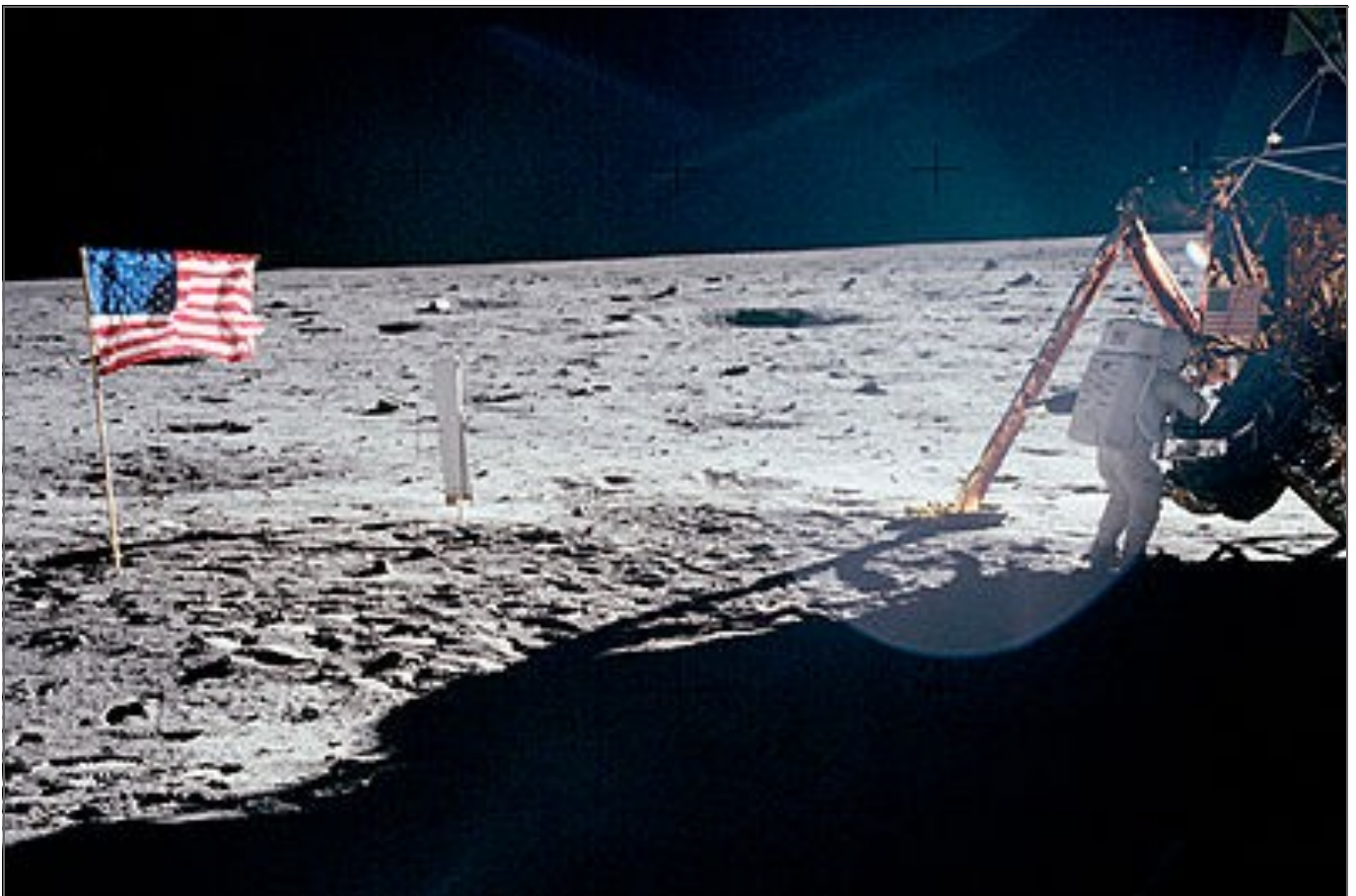
I did not realize what I was about to experience was probably beyond my comprehension at that moment. Just in front of me, Eugene Cernan was having a conversation with Mrs. Armstrong; John Glenn walked up to them and offered her a comforting embrace. Mike Collins who has been in seclusion for years was sitting close by and Buzz Aldrin not too far away from him.

The service commenced with the family and close friends being piped in. The speaker system then reverberated with the sound of John F Kennedy's entire 1962 Voyage To the Moon speech. It felt like he was in the Cathedral and for me set the tone of the moment. Many speakers spoke about Mr. Armstrong and all focused on his great humility and service.

Probably the most resonating speaker was Eugene Cernan who told several stories about Mr. Armstrong bringing laughter and tears to many of the mourners. One of which was that Mr. Armstrong had never received his golden eagles: the official Navy pilot wings. Just last year aboard a ship bound for the gulf he was awarded his wings and he apparently told Mr. Cernan that he was prouder of those wings than having gone to the moon. To me this was an excellent example of the man and his values and his real belief that he was just the tip of the sword and the symbol but not alone in his one step.

Dianne Krall sang "Fly me to the Moon and Mike Collins read the intersession. The family and dignitaries quietly left and it was over. The silence in this giant Cathedral was loud in its absence.

I did get back in time for my board meeting although a half hour late. As I write this I am still unsure how I feel, but one thought is clear: I am happy to have been invited and to have experienced for me what was a goodbye to my kind of hero.



What you missed in September...!

Report from Roger Hill

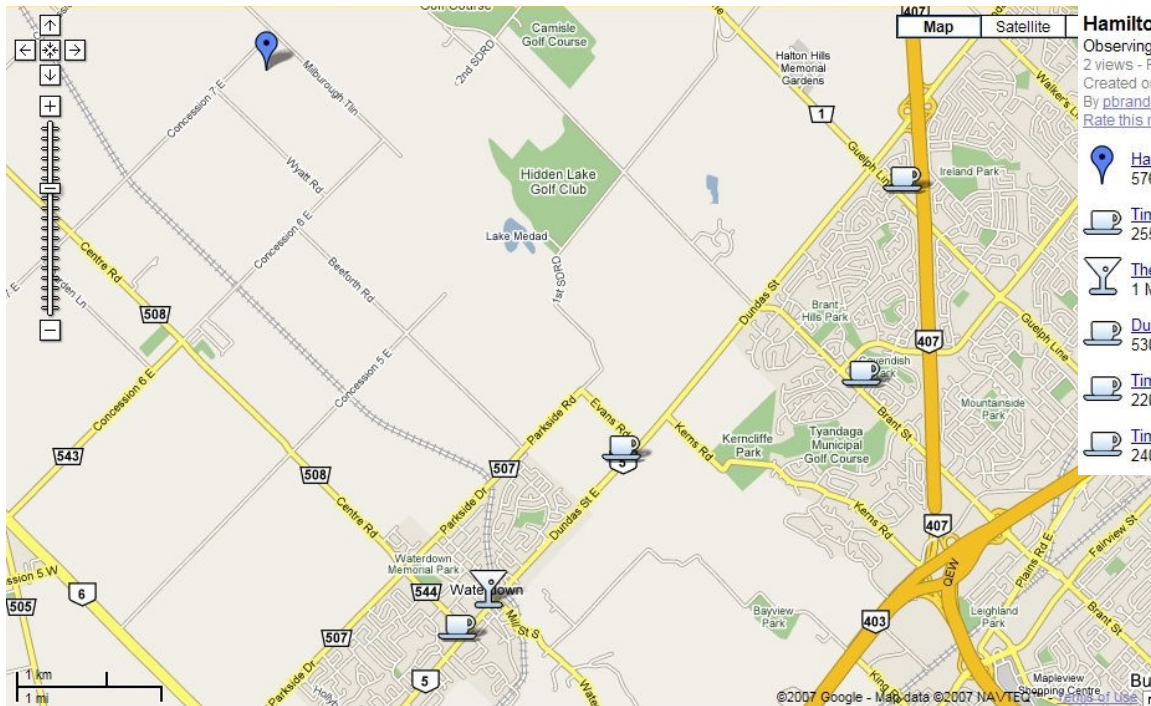
September saw the start of the year for the Hamilton Centre. There was an update on the General Assembly in Edmonton from RASC 1st VP Colin Haig, and a report on what is happening at the national level.

Roger Hill informed the membership on the process that the Centre will have to go through to replace the Centre's by-laws to conform to new Government of Canada requirements for non-profit organizations.

Jason Blane brought us up to date with the clean-up of the Observatory grounds. Joseph Pipitone reviewed The Day the World Discovered the Sun, Roger Hill gave a presentation on the Why and How of modifying a Canon camera (and the wisdom of paying someone to do it for you!).

Andy Blanchard finally got to pin some people by handing out awards, and Gary Colwell reprised his well-received presentation from this years Starfest on Bass-Ackwards Astrophotography.





Hamilton Observing Sites

Observing site in Hamilton and area.
 2 views - Public
 Created on Oct 18 - Updated Oct 20
 By pbrandon
[Rate this map](#) - [Write a comment](#)

-  [Hamilton Centre Observatory](#)
576 Concession 7E, Flamborough, ON
-  [Tim Hortons - Waterdown](#)
255 Dundas St E Waterdown, ON L0R, Ca
-  [The Royal Coachman](#)
1 Main St N Waterdown, ON L0R, Canada
-  [Dundas Street, Tim Hortons](#)
530 Dundas St E Waterdown, ON L0R, Ca
-  [Tim Hortons, Brant Street](#)
2201 Brant St Burlington, ON L7P, Canada
-  [Tim Hortons, Guelph Line](#)
2400 Guelph Line Burlington, ON L7P, Car

Website:

<http://hamiltonrasc.ca/>

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 N43° 23' 27" W79° 55' 20"

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October, 2012 Calendar of Events

Mon	Tue	Wed	Thu	Fri	Sat	Sun
01	02	03	04 • 7:30pm» Annual General Meeting	05	06	07
08 ☾	09 • 7:30pm» Arm Chair Astronomy	10	11 • 7:30pm» RASC Board Meeting	12	13	14
15 ●	16	17 • 7:30pm» Public Night at the Observatory	18	19	20	21
22 ☾	23	24	25 • 7:30pm» Astrophotography Night	26	27	28
29 ●	30	31				

Front cover photograph of the Moon by Ron Brecher, using a Celestron NexImage 5 on a StellarVue 80mm refractor operating at f/4.8.