Peterborough Astronomical Association

The Reflector

Volume 11, Issue 2 ISSN 1712-4425 February 2012

New iPhone game is first NOAA app and only the second NASA game app. Just as with the real GOES-R, the challenge with Satellite Insight is to keep up with the massive influx of weather and other environmental data.

by Dr. Tony Phillips

NASA HAS A JOB opening. Wanted: People of all ages to sort, stack, and catalogue terabytes of simulated data from a satellite that launches in 2015. Agile thumbs required.

Sorting terabytes of data? It's more fun than it sounds.

In fact it's a game: Satellite Insight. The Space Place Team at the Jet Propulsion Laboratory created the entertaining app for iPhones to get the word out about GOES-R, an advanced Earth science satellite built by NOAA and NASA.

Described by the Los Angeles Times as possibly "the nerdiest game ever," Satellite Insight may be downloaded for free from Apple's app store. Be careful, though, once you start playing it's hard to stop. Some reviewers have likened it to Tetris, one of the most popular video games of all time.

GOES, short for "Geostationary Operational Environmental Satellite," is the workhorse spacecraft for weather forecasters. NOAA operates two (at a time) in geosynchronous orbit, one above the west coast of N. America and one above the east coast. They monitor clouds, wind, rain, hurricanes, tornadoes and even solar flares. The GOES program has been in action since 1975.

see "GOES-R" on page 16

President's Message

Assurance or Insurance

You can be assured, we have to be insured. That's the message I got from the Recreation Department of the City of Peterborough. The permits securing our "ownership" of Armour Hill for the events planned for this year have arrived. I was somewhat taken aback when I read the covering letter including the statement "I will require a copy of your insurance, naming the City of Peterborough as a third party insured in the amount of $2 million dollars. I will need this certificate prior to your first event taking place." Rest assured that your executive is taking the necessary steps to obtain the required insurance. There will be an annual cost for this.

Don't forget it is membership renewal time. Come out to the meetings and let's get another great year of astronomy related activities underway.

Rodger Forsyth
PAA President

Letter from the Editor

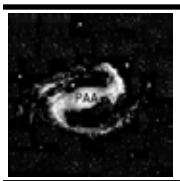
Winter in the Great White North can be exceedingly harsh. So far this year it has been relatively mild with only a few cold snaps and a less than average amount of snow. But one factor that doesn't seem to change is there are typically more cloudy nights than clear ones.

So, while you await spring and clearer skies, you have *The Reflector* to keep you company. John Crossen has a couple of articles that will help you choose your first telescope and praises the GoTo. Rick Stankiewicz turns his camera to the day time sky for a series of photos of atmospheric optics and even an explanation of the three gradations of twilight. And if you bought the RASC's *Observers's Handbook 2012*, count yourself lucky because that's the only way to get yourself a copy Earth Centered Universe, a Canadian owned and developed planetarium software. Yours truly explains how to go about getting the software.

As this edition will hopefully reach you before February 3, it's an opportune time to remind you to come attend our next PAA meeting where guest speaker Peter McMahon will update us on the latest developments on dark sky reservers across Canada. We hope you will all make it out for what will be a very informative and fun evening.

Till next time, happy stargazing!

Phillip Chee
Editor, The Reflector



Peterborough Astronomical Association

The Reflector is a publication of the Peterborough Astronomical Association (P.A.A.) Founded in 1970, the P.A.A. is your local group for astronomy in Peterborough and the Kawarthas.
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February Delivers Six Planets in One Night's Observing

Moon/Venus Conjunction. The thin crescent Moon and Venus make a romantic couple on Feb 25.

John Crossen

It isn't often that you have the opportunity to view six planets in a single night—and four of them are naked-eye targets. Venus, Jupiter, Mars and Saturn require no visual aids to spot them. All you need to find Mercury and Uranus is a pair of hand-held binoculars.

First up for the evening of February 25 is Mercury. The winged messenger is a real horizon hugger, so you may have a difficult time spotting him, especially in the glow of the setting Sun. A view across a lake looking west and a pair of binoculars will help spot tiny Mercury as he skims about 15 degrees up from the lake surface.

Just above Mercury is bright Venus. She's the brightest object in the west, so you can't miss her. If you have binoculars or a small telescope, see if you can detect what phase she is at. Because Venus is inside Earth's orbit we never see her fully illuminated like the outer planets. She is best viewed when at the outer ends of her orbit around the Sun. This gives Venus phases like our Moon.

If you're Venus watching with a telescope or binoculars on February 5 you can pick out Uranus next to Venus. The two will be about a Moon-width apart and fit in the field of view of your binoculars. It

See "Planets" on page 15

PAA January Observing Run Was a Cool Success

From L to R: Rodger, Sean, Janet and Trish. Mika and Nicholas in foreground. John Cameron had to leave early for his long drive home, but the intrepid snow bunny was on site for most of the evening.

John Crossen

The January Twenty-First observing run was greeted by clear skies, enthusiastic PAA members and nippy temperatures. I think the only place colder that night was the upper cloud cover on Jupiter.

Nonetheless, John Cameron, Rodger Forsyth, Sean Dunne, Janet Brown and Trish McCloskey along with son Nicholas and friend Mika gathered at BHO for an astronomically good night's viewing. Mind you, the hot chocolate, coffee and cookies didn't hurt either.

For openers we were treated to a unique view of Jupiter with its moons surrounding the gas giant in a nearly perfect square. In 25 years of Jupiter Watching I have never seen anything like it. Usually the moons are stretched out in a line, but on January 21 they appeared to mark four corners surrounding Jupiter. It was a nifty optical illusion that we won't soon forget.

Orion was front and centre, so everyone had a good look at M42 before we trekked over to Gemini for M35 and next door neighbour Puppis for open cluster M46 with its little planetary nebula peeking out from the fine sprinkle of stars. Using averted vision the planetary nebula popped in and out of view.

Just for comparison we put a wide-field 38mm eyepiece in and could see M46 and part of M47 side-by-side. Both are open star clusters, but while M46 looks like

See "Observing" on page 15

Three in One Trip

Rick Stankiewicz

How do you get three atmospheric phenomenons out of one trip? You let someone else focus on the road. This is what I did last fall as I returned from my trip to northern Quebec. I did not have to do much driving, so I focused on the sky and let someone else do the driving. I would rather take pictures than sleep and when I saw the Sun getting low in the western horizon and nice layer of altostratus clouds were forming, the conditions were ripe for some play of light off the ice crystals in the upper atmosphere. This is exactly what happened too.

The accompanying three shots were all taken over a 34 minute period or about 50 km of travel. I had to take all these images from a moving vehicle because we were part of a convoy heading south to Matagami, Quebec for the night. No one wanted to stop or slow down, so we held a fairly steady 100 km/hr.

This also goes to show that when you have seen one, you have not necessarily, seen them all. Sunlight angles, cloud densities and content can constantly change and this is why the same relatively short time period and seemingly similar conditions can produce different (yet related) phenomenon.

In order of how they appeared, I first noticed the prismatic rainbow effect called, sundogs (or parhelia), at 22-degrees either side of the solar disk. Then came the addition of the upper tangent arc. This was still at the 22-degree distance, but directly

See "Triplets" on page 13

Sundogs, or parhelias.

Once you know the night sky, which telescope is best?

Six Inch Dob. Choosing the telescope that's right for you can be a challenge. No single scope can do it all, so we settle for the best compromise. This 6-inch Dobsonian is portable and costs about $300—less second hand!

John Crossen

This isn't a discussion about which brand to buy. Instead you need to do a little thinking about where you will use your telescope. Right out of the gate think about portability.

Most people live in urban areas where light pollution washes out the night sky to the point that only the Moon, the planets and a few bright stars can break through the man-made haze of wasted light and energy. If you live under such conditions, you'll want a telescope that's portable so that you can pop it in the back of the car and motor off to dark rural skies. If you live in an apartment or like me, your bones feel about 20 years older than your brain thinks they are—portability is also critical.

Cliff dwellers need to consider packing their scope, tripod, eyepieces and a host of other gear onto and off from an elevator, then lugging it across the parking lot and into the car. If that's your case I'd recommend a small refractor, a Schmidt Cassegrain or a Maksutov scope on a simple alt/azimuth mount. At age 67, an 8-inch Schmidt Cassegrain telescope is my max. It fits my subcompact car and I can lift it without straining my back.

Next comes bang for the buck. On that count nothing delivers like a Newtonian scope. Even more so if you choose one with a Dobsonian mount. A short focal ratio Newtonian of f/5 is also fairly compact and portable.

See "Scope Advice" on page 14

Computerized GoTo telescopes, astronomy for dummies?

John Crossen

I confess I used to think so. It's the "old school" in me. First you have to learn your way around the night sky. Then you buy a telescope. And finally you learn where all those nifty deep sky objects are. But in today's world of computerized telescopes the drudgery of finding invisible objects is no longer a right of passage. Just press the button and peek.

For the novice who bought his or her telescope in order to see things, not piddle away half the night trying to find them, the computerized goto scope delivers instant results ... when properly set up. Cutting the drudgery down to reading the owner's manual is a giant leap forward for mankind. So do it first no matter what GoTo telescope you buy.

The term "GoTo" simply means go to. All you do — once the scope is properly set up — is press a button. The scope will go to the object selected and track along with it.

Some scopes like the Meade LS (Light Switch) series even level and align themselves. Just set the scope down and flip the switch to "On." The scopes levels itself, the GPS tells it where it is and what time of night it is. The scope then takes a photo of the night sky that gives it a reference star.

After ten minutes — or about one cup of coffee — the scope is ready to go. Just tell it what you want to see and *click-buzz-whrrrr* it shows it to you at the

See "GoTo" on page 12

C11 in Observatory. Buckhorn Observatory's 11-inch Celestron is press 'n' peek easy plus it tracks along with the night sky so a large number of people can look through it without having to realign the object. Me? I'm lovin' it.

PHOTO GALLERY

The Three Pillars of December

Are solar pillar rare? No, they are actually quite common, but not only do you have to have the right atmospheric conditions for them to occur, but you have to be looking for them too. Just to illustrate the point, the following three images were all taken last December 1st, 23rd and 28th, respectively. I was not checking the sky every morning and evening, but rather just having a quick look near sunset some days. These images are not the best I have captured of this upper atmospheric phenomenon, but it does show that pillars are no always really obvious and rather common.

Solar pillars can occur anytime of year because the condition that creates this affect is actually plate-like ice crystals in the upper atmosphere where it is always cold. They are stacked in a column and the sunlight is reflecting off the bottoms (or tops), as in these cases, toward the views eye. The affect is a long pillar or column of light. They can be quite striking and distinct sometimes.

Typically, solar pillars occur close to sunset or sunrise. They are often more noticeable when the Sun is below the horizon to help block the strong rays that would wash out the affect.

"So what is the connection to astronomy," you might ask? Well, other than being pretty neat to see (each one is unique), they signal the start or end of "twilight." When the Sun sets below the horizon you have about a half hour of "Civil Twilight",

true nightfall and except for light pollution sources, it is as dark as it will get at your location. In the wee morning hours before sunrise, the opposite is true, so first there will be Astronomical Twilight, ending with Civil Twilight, as the Sun reaches the horizon. Why is all this important? Well, depending on the time of year and what time sunrise and sunset are, you can plan or gauge your celestial viewing according to how dark you need it to be and what you plan to see. You might be able to see the Moon anytime of day or night, but if you want to see the stars or some constellations, you better wait for Astronomical Twilight at least.

Another interesting note is in comparing the location along the western horizon from the pillar from December 1st to the pillar of December 23rd you will notice that the Sun is setting at a different point

see "Pillars" on page 12

as the Sun sinks from greater than 0 to 6 degrees below the horizon.

During this time there is enough light in which to see details at a short distance. Some people say you should still be able to see the face of your watch with out using another light source. Next comes the "Nautical Twilight", which covers the next half hour up to an hour after sunset (the Sun is greater than 6 to 12 degrees below the horizon). During this period, detail without a light source is lost, but you can still "navigate" by silhouettes and the brightest stars will be visible for navigational purposes too. Lastly, comes the "Astronomical Twilight", from an hour to an hour and a half after sunset (now the Sun is greater than 12 to18 degrees below the horizon) and you guessed it, it is dark enough to see stars. The brightest stars were already visible, but now whole constellations will be visible to the naked eye. Then you are at

Venus's Mirror

You are so beautiful; it is hard not to notice you,
You shine high in the evening sky.
No one stops to see you but me,
I find it difficult to understand why.

The most brilliant of all stars and planets,
You make your presence known.
You're full of surprises, to us Earthly observers,
Your crescent shape, to the naked eye, is not shown.

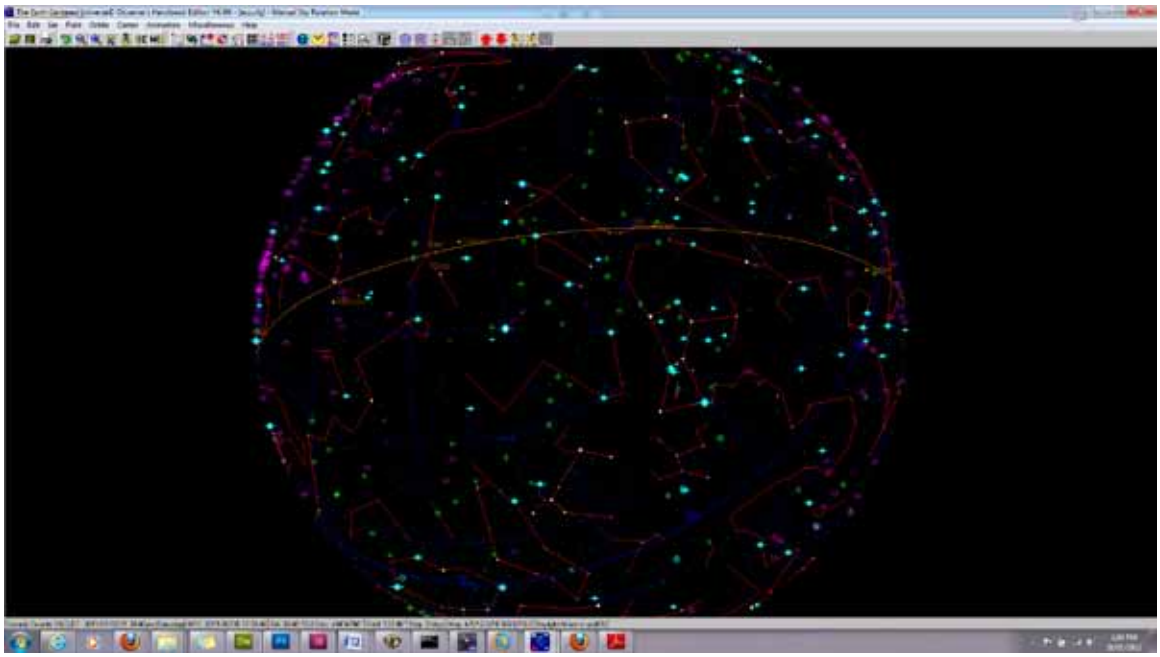
The twilight colours accentuate your beauty,
A dull contrast to the brilliant, "Evening Star".
Every cloudless night you sit high,
In the southwest, I know where you are.

The still waters pay you homage.
The reflection does not do justice to your beauty.
Like a mirror held in your hand,
The Otonabee River's calm surface does its duty.

Reflection by,
Rick Stankiewicz

(Image taken December 12, 2011, on the Otonabee River, with a tripod mounted Canon 400D and Canon 18-200mm at 24mm; ISO 200; f/4.0; exposure 1/8 sec.)

Free PC Planetarium Software for RASC Handbook Readers



Phillip Chee

If you picked up a copy of the RASC's *Observer's Handbook 2012* you will have noticed a small blue label on the right-hand side of the cover with the intriguing message: **FREE PC planetarium software, *see inside!***

After reading the inside pages you will be directed to the web site **www.nova-astro.com/handbook** whereupon you will find a webform to obtain your copy of the Earth Centered Universe (ECU) Pro "Observer's Handbook Edition" planetarium software. The RASC and Halifax, Nova Scotia's, Nova Astronomics, (the software developer) have teamed up to offer *Observer's Handbook 2012* owners a free copy of ECU that works until March 31, 2013. Inside each *Handbook* is a unique serial number and unlocking code.

I filled in the form and within minutes received an email with the link to ECU, whereupon I downloaded and installed it in a virtualized version of Windows 7 (64-bit). The operating system requires any computer running Windows 200/XP/Vista or 7 (32- and 64-bit versions of the the latter two.) The fact that the software runs well in emulated mode is great for Mac OS X and Linux users.

The software is a limited edition of the Pro version of ECU. The software includes data from 17 database/catalogs used in the *Handbook*. Missing from the *Observer's Handbook Edition* are the following:

1. All telescope control functions
2. GPS location/time set feature
3. Principal Galaxy Catalog
4. SEC planetary nebulae catalog
5. Lowell asteroid database (can be downloaded by the user)
6. Hubble Guide Star catalog
7. Access to the USNO star catalog
8. Object reports
9. Object list functions

see "ECU Handbook Edition on next page

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GoTo

punch of a button. There's even a built-in audio track (called the astronomer inside) that delivers a brief chat about whatever object you've dialled up.

Celestron has recently introduced a similar series of scopes called their Prodigy Line. Again, your biggest job is pressing a button to start the process and then waiting while the scope does all the work.

Billed as "the first truly affordable smart telescopes" they are ready to go in three minutes. Again, you don't have to know diddle about astronomy. Just press and peep.

Celestron's Sky Prodigy Series tops out at about $800 while Meade tickles your pocketbook to the tune of $1,300 for their 8" Light Switch model. So what's the difference? Meade delivers greater aperture — light gathering power and better optics. Plus it has a more extensive data base.

Both Meade and Celestron offer a myriad of other computerized goto scopes as do SkyWatcher, Orion and iOptron. And they're all good.

At the observatory we have an 11-inch Celestron goto and a 5-inch refractor on an Orion Atlas GoTo mount. Plus we use an iOptron goto mount for off-site observing.

GoTo telescopes are great. But like anything computerized they can be finiky. And when the batteries fail, it's game over. I highly recommend buying any goto scope or mount from an astronomy store. They have the staff with the answers you need.

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Pillars

on the horizon. Using the large topped silhouette of the white pine tree as a westerly reference point in these to images, you will see that the Sun is setting over the tree, which is more southerly of where it was setting twenty-two days earlier. Coincidentally, the setting Sun on the 23rd was just a day after the Winter Solstice (shortest daylight hours of the year) and marks the most southwesterly point along the horizon that the Sun will set for the year, at least from my vantage point. From this point on, until the Summer Solstice in June, the Sun will continue to set further north or to the right of the pine tree, each day. And so ends the tale of The Three Pillars of December.

Rick Stankiewicz

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ECU Handbook Edition

If you like the software and would like to have the missing features, Nova Astronomics offers an upgrade to the full edition for the price of $39.95, a 50% discount off the full retail price. The manual comes in PDF and is accessed via the software's Help menu. While the graphics are not as splendid as say Stellarium (a free planetarium software), the ECU Observer's Handbook Edition is a nice companion to the printed *Observer's Handbook 2012*.

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Triplets

above the disk and looks more like a " rainbow smile" or open "V" shape. Lastly, everything was joined together in a 22-degree solar halo, just like a rainbow around the Sun. This was how I ended my day of travels, watching the Sun set as it put on a very nice show for all that took notice. It sure helped pass the time for me.

Upper tangent arc.

Twenty-two degree solar halo.

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Scope Advice

Something else to consider is what celestial objects you enjoy viewing. Planets and the Moon provide satisfying views in a small refractor, Schmidt Cassegrain, Maksutov or Newtonian. Even giant binoculars work.

At the opposite end of the scale come the faint deep-sky objects like nebulae, distant galaxies and small star clusters. They call for the light-gathering power of big aperture scopes—usually Newtonians. So muscle-up your body and your bank account.

A 10- to 16-inch Newtonian can put up to a $2,500 dent in your bank account and wreak equal havoc on your back bone. The really big Newts in the 20- to 25-inch category require a van or trailer to haul them around. As far as cost goes, bring at least $10,000 to the party—double that if you want GoTo capability and tracking as well.

All of which brings us to your budget. My advice is to buy the best you can reasonably afford. And don't overlook the used market. Somebody is always moving up and that's where you move in. The savings can be substantial. `www.astrobuy-sell.com` is a good Canadian resource.

Where should you buy your gear? A dedicated astronomy store is a great start. A big box store is a really bad start. The difference is experienced sales people. The people in an astronomy store actually use the equipment they sell. They've been through that "first scope" syndrome and can interpret what you tell them so that they will suggest the best scope for you. The person in the big box store was probably selling support stockings and dental floss last week. Hum, no imagination required on that point.

The Sky this Month

Mercury at superior conjunction on the 7th. Reappears in western evening sky during last ten days of the month and providing best evening apparition by months end.

Venus in western evening with favourable viewing along higher angle of ecliptic. Waxing crescent Moon passes 3° N on the 25th.

Mars rises mid-evening in eastern Leo retrograding and brightening to its March 3 opposition.

Jupiter in the western evening sky in Aries and sets near midnight. Crescent Moon passes 4° N on the 27th.

Saturn in Virgo northeast of Spica rising in late evening. Begins retrograde motion on the 8th.

Zodiacal Light visible in the west after evening twilight for two weeks from the 10th.

Moon Phases

Full Moon	4:54 PM	February 7
Last Quarter	2:04 PM	February 14
New Moon	5:35 PM	February 21

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Planets

will be an conjunction of two vastly different worlds.

Jupiter is high in the southern sky as the Sun sets and you can see both Venus and the god of mirth and merriment at the same time with no visual aids. Jupiter will be slightly dimmer than Venus and higher in the sky.

On February 25 Venus is joined by the thin crescent Moon for an excellent photo opportunity. A simple camera on a tripod should capture the two subjects. Try different speeds and durations to see what works best with your digital camera. A cable release will also help eliminate vibrations. With a small telescope you can also see Jupiter's moons Io, Ganymede, Europa and Callisto.

Mars will be on the rise by 11 pm during February. It will also have drawn closer to Earth and should be a bit brighter than in December or January. To find Mars you need to find the constellation Leo which will be well up in the east. Mars will be the bright red planet just below Leo. If a telescope is available you should be able to make out the polar cap and some surface detail in the form of dark blotches. With any luck we'll have the best pictures ever after the Mars Rover Curiosity lands on August 6.

The last planet up is Saturn. It's a predawn target so technically when you see Saturn it will be the next day. But most observers just think of the early morning hours as part of the same observing run.

This year Saturn will be in the constellation Virgo and will be situated near the bright star Spica in February. The ringed thing will have its rings tilted towards us more this year and will provide a stunning view even in a small telescope.

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Observing

fine-grained sugar, M47 is much more course and sparsely populated.

From there we spun the dome and had a look at the galaxies M81 and M82 in the 24mm Panoptic. It's a beautiful pairing and always a pleasing sight. Of course the Seven Sisters of the Pleiades weren't to be denied and they too, put on a good show.

Our final target for the night was Mars which was just rising south of Leo. The planet was very low, so the atmospheric "soup" near the horizon blurred any detail, though the planet did resolve into a neat round ball. I must confess, after everyone left I hung in until Mars had risen higher in the sky and sure enough, you could easily make out the polar ice cap. It looked like a little white beret capping the red-faced planet.

The chill of the night has finally melted out of my bones, but the memory of our unique view of Jupiter and the fun we had will remain for a long time to come.

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GOES-R

GOES-R is the next-generation satellite with advanced technologies far beyond those of the older GOES satellites. It has sensors for lightning detection, wildfire mapping, storm tracking, search and rescue, solar imaging, and more. Many of the sensors are trailblazers. For example, the Advanced Baseline Imager has 60 times the capability of the current imager — 16 channels instead of 5. It has twice the spatial resolution and five times the temporal refresh rate, including the 30-second imaging of weather systems over a region of 1000 km × 1000 km. Also, the Geostationary Lightning Mapper can count and pinpoint lightning bolts over the Americas 24/7. It's the first such detector to fly on a geosynchronous satellite, and it could lead to transformative advances in severe storm warning capability.

All in all, GOES-R represents a "huge technological leap from the current GOES." We know this because Satellite Insight tells us so. The app has an informative "Learn More" feature where players can find out about the satellite and the data they have been sorting.

Which brings us back to sorting data. It's a bit like eating Cheerios; just don't tell the kids it's nutritious, and they love it. Helping GOES-R gather and stash data from all those advanced sensors is just as satisfying, too — a dose of Earth science wrapped in thumb-flying fun.

More information about Satellite Insight may be found on the web at **http://itunes.apple.com/us/app/satellite-insight/id463588902?mt=8**. The game is also available in web form (flying thumbs optional) at **spaceplace.nasa.gov/satellite-insight**.

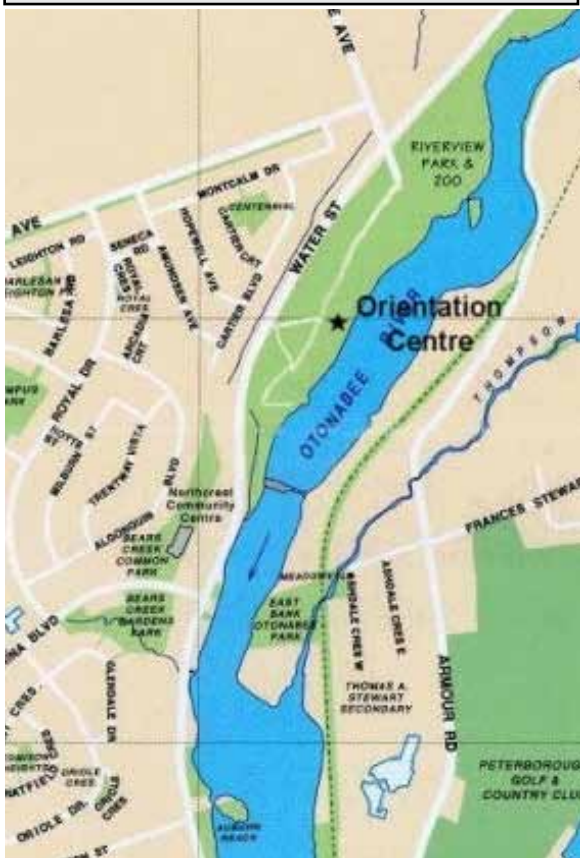
This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). If your article contains photso or graphics, please provide a separate file for each. Typed or hand-written submissions are acceptable provided they are legible (and not too long.) Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor's sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to:

phillip.chee@gmail.com

NEXT SUBMISSION DEADLINE:
FEBRUARY 24, 2012



Meetings

The Peterborough Astronomical Association meets every first Friday of most months at the **Peterborough Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at 8 p.m. P.A.A. executive business will be conducted starting at 7:30 P.M. Members and the public are welcome to attend the earlier time.