



# CASI TORONTO FLYER

FEBRUARY 2018, Volume 25 #4

## Toronto Branch Membership Newsletter

### NEWSLETTER LINKS

*Click on any of the links below to move to other sections of the Newsletter*

[Industry News](#)

[Academic News](#)

[Museum News](#)

### UPCOMING CASI EVENTS

*Keep an eye on email and social media for information about upcoming CASI Toronto Branch meetings.*

### SPREAD THE WORD

Help us to publicize our Toronto Branch meetings. Share your meeting notice with friends and colleagues, and post them around your school or workplace.

### YOUR NEWSLETTER

The CASI Toronto Flyer brings you local aerospace news. Suggestions and/or contributions are always welcome. If you've been to an interesting lecture or want to see coverage of an aerospace business in southern Ontario, let us know. Contact the Editor, Gillian Clinton, of Clinton Research, at:

[gillian@clintonresearch.ca](mailto:gillian@clintonresearch.ca)

or

[caserontobranch@gmail.com](mailto:caserontobranch@gmail.com)

### CONTACT US

Get in touch with CASI Toronto Branch Executive with questions, comments, suggestions or to volunteer:

[caserontobranch@gmail.com](mailto:caserontobranch@gmail.com)

[Facebook](#) ("CASI Toronto")

CASI website [casi.ca/toronto](http://casi.ca/toronto)

Executive members plan and run the monthly meetings, connect with GTA aerospace schools, and host the annual dinner meeting.

Our 2017/18 Executives are:

*Chairman – Chris Hayball*

*Vice Chair & 'Flyer' Editor – Gillian Clinton*

*Councillor – Alex Tsoulis*

*Treasurer – Bhavik Mody*

*Education – Yasmin Saeedi*

*Secretary – Fatemeh Mousavilar*

*Members at Large:*

*Amir Masoud Tahvilian*

*Harshita Patel*

### UPCOMING EVENTS IN TORONTO



**CAHS Toronto Chapter Meeting**

When: **Saturday, Feb. 3, 2018**

Time: 1:00 PM

Kenneth I. Swartz, Aerospace & Aviation Journalist will speak about *Canadian Aircraft Manufacturing in the Modern Era* at the Canadian Forces College



*Bombardier Q400 Assembly Line at Downsview (Bloomberg Inc.)*

Landing Fee: \$3 for refreshments

215 Yonge Blvd. @ Wilson Ave.  
(Lt. – Gen Guy Simonds  
Auditorium – Ground Floor)



The **Canadian SmallSat Symposium 2018, February 13 - 15**, is focused on Space Sustainability, in advance of COPUOS' presentation to the United Nations General Assembly in 2018.

To position Canada to provide solutions and technologies to mitigate this concern, the CSCA is bringing together stakeholders from across the country and inviting international participation to provide a forum for discussion and collaboration.

### Students - 50% off!

[More information/registration links](#)

### Women in Planetary Science & Exploration (WPSE)

WPSE 2018 highlights the achievements of women and non-binary researchers in a range of space-related fields while offering an opportunity to discuss, challenge, network and support #WomenInSTEM.



The event will take place on **February 17 - 18, 2018** at the University of Toronto in the Bahen Centre for Information Technology.

More information is available at [wpse2018.ca/](http://wpse2018.ca/).

## INDUSTRY NEWS

### BOMBARDIER

the evolution of mobility

#### Bombardier Statement on Review of Options for Downsview Site

**TORONTO – January 12, 2018** – “Bombardier is in the midst of a 5-year turnaround plan to ensure our long-term success as a company. As part of this turnaround plan, we have been reviewing our facilities worldwide – including Downsview – to ensure we have the most efficient and cost effective operations necessary to support our growth objectives.

We remain committed to strongly supporting the Ontario aerospace industry and the Downsview Aerospace Innovation and Research Initiative, as we look at options for our Downsview site. Behind this review is the fact that Bombardier currently uses only about 10 percent of a 375-acre site and bears the entire cost of operating a 7,000-foot runway.

We understand that the property's unique location, proximity to public transit, major highways, universities and shopping make it an ideal location for employment and other uses, and we will work with all stakeholders throughout our review process.”

### CSA Awards Contract for UV/Optical Wide Field Space Astronomy Study

**CAMBRIDGE, ON -- January 29, 2018** – The contract award went to COM DEV (Honeywell Canada) and is valued at \$517,387.50 and is for the Science Maturation Study for UV/Optical Wide Field Space Astronomy.

The CSA describes the contract works as follows: “The Canadian Space Agency (CSA) located in St-Hubert (Quebec), is seeking proposals for one Science Maturation Study in Space Astronomy targeting wide field UV/optical imaging telescope aimed principally at the investigation of dark energy. The overall objectives of CSA Space Exploration Strategic Planning Science Maturation Studies are to mature and validate science requirements and plans for future missions in planetary science, space astronomy and life sciences investigations. This study follows a previous concept study for a UV/optical wide field space telescope. The Science Maturation study will refine science objectives and requirements as well as propose a plan forward including cost and schedule estimates.”

COM DEV has approximately 15 months to complete the study.



## ExactEarth Says Sale, Merger Possible as Company Explores Options

**CAMBRIDGE, ON – January 26, 2018** – ExactEarth is exploring options ranging from financing to a sale or merger of the company as it strives to maximize shareholder value.

The announcement came Thursday as the Cambridge-based company released its fourth-quarter and fiscal 2017 financial results that reflected an annual revenue decline of \$6.1 million, and a net loss of \$33.8 million for 2017. That loss includes a \$26.9-million non-cash charge related to the impairment and writedown of certain assets, the company reported.

ExactEarth uses a network of satellites to collect and provide vessel data for ship tracking.

The company's board of directors has established a special committee to explore and evaluate potential options, which could also include a sale of assets, it said in a news release.

During a conference call with analysts, chief executive officer Peter Mabson said the decision to form the committee "is viewed as a very appropriate step at this point." Mabson stressed there's no guarantee anything will change as a result of the review, and said there's no firm timeline for the process.

Asked whether the review came about as result of an outside inquiry or a need for cash, Mabson

said he couldn't comment on any specifics.

The committee will include new board member William "Mac" Evans, former president of the Canadian Space Agency who negotiated Canada's role in the International Space Station.

ExactEarth is in the midst of deploying its second-generation technology, which provides real-time data as opposed to information that was updated hourly. Eighteen of the new satellites are in operation; more than 60 are expected.

The system, in partnership with Harris Corp., represents the "gold standard" in vessel detection and monitoring, Mabson said.

Real-time data used by ExactEarth clients could heighten maritime security, enhance search and rescue capabilities and help better manage fisheries, he said. "This really is a substantive capability that we're developing here." While Mabson acknowledged that client adoption of the new technology will take longer than the company previously expected, its view of its long-term potential hasn't changed.

ExactEarth was a subsidiary of Com Dev International, the Cambridge manufacturer of space hardware that was purchased by Honeywell in 2016. Under the deal, ExactEarth was spun off as a standalone, publicly-traded company, while Com Dev was delisted from the Toronto Stock Exchange.

*By Brent Davis, Waterloo Record,  
b d a v i s @ t h e r e c o r d . c o m ,  
@DavisRecord*



## Canadian Nanosatellite Launch from China Herald New Era of Satellite Services

**TORONTO – January 24, 2018 –**

A new era in space communications began on Friday January 19 with the successful launch of an ultra-low-cost telecommunications satellite from Canada-based Kepler Communications. The mission serves as a technology demonstration for Kepler's novel Ku-band telecommunications payload, and offers the best price per MHz of any communication satellite on the market.

With this launch, the Canadian start-up becomes the first commercial company ever to launch and successfully operate a LEO communications satellite in Ku-band. This highly valuable frequency band is ideal for telecommunication services, and is currently being sought for use by many companies planning on deploying mega-constellations of satellites. Kepler's network of satellites will eventually enable in-space connectivity for other satellites, space stations, and transport vehicles.

"We are really excited that we are the first to deploy a commercial Ku-band LEO spacecraft," said Kepler CEO Mina Mitry. "While the goal of Kepler will be to establish an in-space connectivity network, we recognize the need for a sustainable and incremental deployment of services and technologies in order to achieve this goal."

This incremental deployment approach has driven Kepler's inaugural service, which focuses on relieving the high cost and limited bandwidth real-time satellite connectivity with a delay tolerant service. Mitry argues that "there is a tremendous amount of data out there that doesn't need real-time connectivity, but just needs to move – GIS data, aggregated IoT sensor data, CCTV backlogs, even media. We can move high volumes of this data, we can do it cheaply, and we improve our quality of service with every new satellite we launch".



Kepler is taking advantage of the market opportunity for bulk data transfer that is largely overlooked by others in the industry today. "There are companies out there putting hard drives on helicopters and flying them around because there aren't alternatives to transport bulk data," Mitry said. "This standard practice will gradually be replaced by affordable connectivity solutions like ours to move data from remote locations, simplifying logistics and improving business sustainability in the long term."

Bulk data transfer isn't the only application that the company sees in the near future. Kepler also sees a market opportunity for providing narrowband satellite connectivity to enable the "Internet of Things", or IoT.

"The challenge with IoT is that to create a truly compelling business model, you need lots of devices connected," Mitry said. "That

requires pricing and performance on par with terrestrial wireless. The amount of spectrum in Ku-band presents a viable way of doing this, but there needs to be substantial technology advancements before we can get there. Being the first to actually deploy a LEO Ku-band system gives us a first-mover advantage."

The market for IoT connectivity is compelling. Applications include asset tracking for railcars, shipping containers, or construction equipment. It includes connecting soil moisture sensors, seismic monitors, or even refuse bins. "We can see applications that require 100s of millions of connected devices," Mitry said. "But this only will be realized if we can get the user devices to the price, power, and size that enable customers to reach large scale deployments."

The number and size of operational spacecraft in Kepler's constellation will vary at times based on customer demand and new applications. Each satellite added to the network will incrementally increase overall throughput and reduce revisit time. "As the need for connectivity increases, we increase our constellation capacity in tandem," Mitry said. "It's how we believe we can sustainably deploy a LEO constellation."

The initial Kepler nanosatellite was launched from the Jiuquan Satellite Launch Center (JSCLC) in Northwestern China with launch service provided by China Great Wall Industries Corporation and contracted through Innovative Space Logistics. Jiuquan, founded in 1958, was the first of China's four spaceports. This marks the 100th successful launch from JSCLC to date. More Chinese launches have occurred at Jiuquan than anywhere else in the country. Kepler is the first Canadian

spacecraft ever launched from China.

The Kepler spacecraft was built in partnership with Clyde Space Ltd who provided the spacecraft bus, as well as Bright Ascension Ltd, who provided the on-board software. The Kepler ground support network was built in collaboration with Comtech EF Data, Kongsberg Satellite Services, Innovative Solutions in Space, and Nextologies. The Kepler payload was developed in collaboration with Enclustra and AHA (of Comtech EF).

The successful deployment of Kepler's first nanosatellite is a key demonstration of the company's core technologies: software-defined radios and antenna arrays that can efficiently exploit available spectrum from space. Kepler has several customers already signed up to take advantage of the backhaul service available from the first nanosatellite.



## Magellan Delivers Canadian Satellite Power Control Unit for Upcoming Space Mission

**TORONTO – January 22, 2018 –** Magellan Aerospace ("Magellan") announced today that it has delivered the first of three Power Control Units ("PCU") for an upcoming space mission. In 2016, Magellan was selected by the Laboratory for Atmospheric and Space Physics ("LASP"), at the University of Colorado Boulder, to provide satellite technology for a future Deep Space Interplanetary Mission. Under the contract,

Magellan's Winnipeg facility will deliver three PCUs and subsystems for three jointly-developed Control and Data Handling (C&DH) units. The end user customer and program cannot be identified for contractual reasons.

Magellan will provide their flight-proven PCUs and C&DH subsystems that utilize expertise developed by Magellan for past and current Canadian Space Agency missions. The C&DH provides spacecraft control processing, command decoding and processing, telemetry encoding, and data handling and mass storage. The PCU provides power distribution and control, is scalable, and can be configured as either single string or dual string redundancy.

Mr. Daniel Zanatta, Magellan's Vice President, Business Development, Marketing and Contracts said, "The selection of Magellan's technology for an international space mission is an excellent innovation and export success story for Canada."



## **Maxar Technologies Appoints Mike Greenley as Group President of MDA, One of Canada's Most Innovative Technology Companies**

**BRAMPTON, ON – January 3, 2018** – Maxar Technologies Ltd., a leading global provider of advanced space technology solutions for commercial and government markets, today announced the appointment of Mike Greenley to serve as Group President of MDA, a Maxar Technologies company with internationally recognized leadership in space robotics, satellite antennas and subsystems, surveillance and intelligence solutions, and defense and maritime systems.

Reporting to the CEO of Maxar, Mr. Greenley assumes responsibility for taking MDA to the next level of growth and profitability. His responsibilities will include all of the MDA lines of business and its 1,900 employees. Primary locations include Surveillance and Intelligence in Richmond, British Columbia, Ottawa, Ontario, Halifax, Nova Scotia; Robotics and Automation in Brampton, Ontario; and Satellite Subsystems, in Montreal, Quebec. The appointment is effective from January 15, 2018. Mr. Greenley will be based in the Brampton, Ontario office.

"I am extremely pleased to announce this appointment, given Mike's outstanding track record

and over 20 years of experience leading profitable growth for aerospace and defense companies in Canada and internationally", said Howard L. Lance, president and chief executive officer of MDA. "MDA is one of Canada's most innovative technology companies with an earned reputation as a trusted partner, due to its decades of industry leadership. As a Canadian, Mike's leadership will continue to reinforce MDA's ongoing commitment as a partner to the Government of Canada, our commercial customers, and our employees in Canada."

Most recently, Mr. Greenley was Sector President of L-3 WESCAM, based in Burlington, Ontario since 2016. L-3 WESCAM is a leader in Canada and worldwide in electro-optical/infrared (EO/IR) imaging and targeting sensor systems across defence, homeland security and law enforcement markets. Previously from 2013 to 2016, Mr. Greenley served as vice president and general manager of CAE Canada, supporting defence and security markets. Prior to CAE, he served from 2008 to 2013 with General Dynamics (GD), first as vice president of strategy and business development for GD Canada, then as vice president international for GD Mission Systems. From 2004 to 2008, he served as vice president of the modeling and simulation business at CAE.

"I'm honored to be selected to lead MDA, a pioneer of the Canadian space technology industry whose prestige and impact to global customer missions reaches far beyond its borders", said Mike Greenley. "I'm confident that our deep domain experience,

combined with capabilities from Maxar's portfolio, will enable us to unleash a new level of innovation and technology investment in Canada and an expansion of our exports from Canada to world markets."

Mr. Greenley holds a Master of Science degree and a Bachelor of Science (Hons) degree from the University of Waterloo. He is a former Chairman of the Board of the Canadian Association of Defence and Security Industries (CADSI). He is a past chair of the Industry Advisory Board, Department of Foreign Affairs and International Trade (DFAIT) in Canada. In 2016, Mr. Greenley was named Defence Executive of the Year by Canadian Defence Review. He is also a 2012 recipient of the Queen Elizabeth II Diamond Jubilee Medal for service to peers and country.

## ACADEMIC NEWS



### Liftoff! U of T Startup's Business Takes Flight with Satellite Launch in China



*The rocket that carried Kepler Communications' first nanosatellite into orbit blasted off from the Jiuquan Satellite Launch Centre in northwestern China on Jan. 19, 2018 (photo courtesy of Kepler Communications)*

**TORONTO – January 22, 2018 –** A tiny, bread loaf-sized communications satellite built by a University of Toronto startup spent the weekend quietly zipping over the heads of unwitting Torontonians – and there are likely many more to come.

Kepler Communications, founded by U of T alumni, said its first nanosatellite was successfully deployed by a rocket that launched on Jan. 19 from the Jiuquan Satellite Launch Centre in northwestern China. At an altitude of about 552 km, the satellite's polar orbit takes it over Kepler's home base in Toronto twice in the morning and two more times in the evening.

The launch – touted as a first for a commercial communications satellite operating in low earth orbit

on a frequency known as the Ku-band – is an important first step toward Kepler's goal of providing low-cost data communications for connected devices on Earth and beyond.

But, for now, Kepler's founders are just revelling in their accomplishment.



*Kepler's team in their downtown Toronto office (photo courtesy of Kepler Communications)*

"The company began two years ago with a conversation at the bar," says Jeffrey Osborne, a co-founder of Kepler who studied aerospace engineering at U of T.

"So you get a little awe-inspired when you actually put something in orbit. That's pretty cool."

The startup uses two ground-based stations to communicate with its inaugural satellite. One is located in Markham, Ont., and handles telemetry and tracking. The other is in Inuvik, N.W.T., and handles the satellite's payload communications.

Initially, the satellite will use the high-frequency Ku-band to cheaply transmit large quantities of non-time sensitive data for a handful of customers. With only one satellite, Kepler is not equipped to offer real-time communications links.

"You're thinking of things like an offshore oil and gas platform that

wants to move terabytes of environmental or GIS data, or CCTV camera footage," Osborne says. "They can send a lot of data and do it really cheaply – and we can provide a global service."

The decision to use the high frequency Ku-band was a deliberate choice. Though it presented Kepler with some key engineering hurdles, it's capable of handling a lot of data and allowed Kepler to build its affordable nanosatellites with smaller components, Osborne says.

Osborne and other members of Kepler's 15-person team tracked the rocket launch through WhatsApp messages from Kepler co-founder and CEO Mina Mitry, who travelled to China to witness the event first-hand.

"We are really excited that we are the first to deploy a commercial Ku-band [low-earth-orbit] spacecraft," Mitry said in a press release issued by the startup.

The road to last week's launch began at U of T's Faculty of Applied Science & Engineering. Kepler's co-founders, who also include U of T alumni Mark Michael and Wen Cheng Chong, also leaned on the services of several U of T entrepreneurship hubs, including The Entrepreneurship Hatchery, the Creative Destruction Lab and Start@UTIAS, which is affiliated with the University of Toronto Institute for Aerospace Studies.

The plan is to eventually launch dozens more of the tiny satellites to form a constellation that will help transmit the vast quantities of data needed to realize the Internet of Things, a term that refers to

millions of interconnected machines, devices and sensors.

Kepler says it foresees commercial opportunities helping companies to track assets like railcars, shipping containers or construction equipment. It could also provide the linkages necessary to enable the deployment of remote soil moisture sensors or seismic monitors.

"As the need for connectivity increases, we increase our constellation capacity in tandem," Mitry said in a statement. "It's how we believe we can sustainably deploy a [low-earth-orbit] constellation."

While Kepler's current focus is using space satellites to cheaply connect things back here on Earth, Osborne says the long-term vision is to seed a new "space economy" by enabling connections between space-based equipment and vehicles.

"We have fundamental belief that infrastructure spurs development," he says.

*Article by Chris Sorensen, UofT*



## NorSat-3 Ordered by Norwegian Space Centre, Satellite Under Construction at SFL

**TORONTO – 10 January 2018 –** The Space Flight Laboratory (SFL) announced today that NorSat-3, a 15-kilogram microsatellite, has been ordered by the Norwegian Space Centre, and that construction is well underway. NorSat-3 follows from the highly successful NorSat-1 and NorSat-2 satellites also built by SFL.

NorSat-3 (see Figure 1) will carry an experimental navigation radar detector to augment ship detection capabilities from its Automatic Identification System (AIS) receiver. NorSat-3 will add another satellite to Norway's assets in space – four in total so far, all producing data related to maritime traffic monitoring. Combining a navigation radar detector and AIS receiver will potentially provide much better maritime awareness for the Norwegian Coastal Administration, Armed Forces and other maritime authorities.

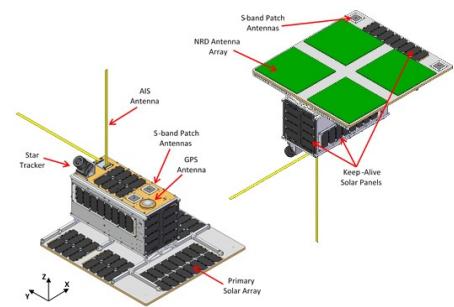


Figure 1: NorSat-3 concept

The satellite is funded by the Norwegian Coastal Administration and managed by the Norwegian Space Centre. The Norwegian Defence Research Establishment (FFI) is leading the development of the radar detector payload which is funded by the Ministry of Defence. NorSat-3 is designed to capture signals from frequencies which the International Maritime Organization has allocated for civil navigational radars.

Automatic Identification System (AIS) message reception alone may not provide a complete picture of maritime traffic. The problem of missing or manipulated AIS messages can only be addressed through the use of supplemental sensing technology. In the case of NorSat-3, a navigation radar detector provides some supplemental support. Detections of navigation radar from ships will provide the ability to verify the accuracy of received AIS messages and also the ability to detect ships whose AIS messages have not been received.

NorSat-3 represents another barrier breaking, paradigm shifting advance in smaller satellites using SFL's Next-generation Earth Monitoring and Observation (NEMO) platform.



## New Study from Western Engineering Will 'Lessen Stress' on Aerospace and Nuclear Industries

LONDON, ON – January 12, 2018

– A researcher at Western University has discovered never-before-seen deformation and stress levels in two materials – titanium and zirconium – both technologically important to the aerospace and nuclear industries.



Mechanical and Materials Engineering professor Hamid Abdolvand (seen above) believes his work could lead to safer and longer lifespans for these materials, critical when considering the ways in which titanium and zirconium are used globally on a daily basis.

The study was published today by the journal *Nature Communications*.

Due to their unique mechanical properties, hexagonal closed-packed (HCP) polycrystals like titanium and zirconium are used extensively in many manufacturing and engineering sectors. But this industry-wide reliability is not without its concerns. For instance, the interaction and load sharing

between the crystals, also known as grains, of titanium alloys can lead to a phenomenon known as cold dwell fatigue, which limits the life span of commercial aerospace components. Likewise, such interactions in zirconium alloys control the process of delayed hydride cracking in the key core components of nuclear reactors.

"If you have a strong grain, located in the middle of a lot of other stronger grains, the load in that middle grain relaxes because the other grains around it are now carrying the load. This simple concept can be used for tailoring and manufacturing stronger, and better engineering materials," says Abdolvand.

Despite previous comprehensive analysis of HCP polycrystals, it has never been reported - until now - that grain-resolved stresses, along the loading direction, can drop while applied stress increases.

According to Abdolvand, the current assumption is that the load of each grain increases as tension is applied. But what Abdolvand found was, in 30 per cent of grains in zirconium and 20 per cent in titanium, that the effect is the opposite.

"It's always been hard to determine how these grains in materials interact and we wanted to explain it. They share the load in a very specific way," says Abdolvand. "But they have not been behaving in a way that we have been perceiving and thinking about for so long. This has become possible by developing new and advanced modeling and experimental toolboxes."

Abdolvand, who joined Western's Faculty of Engineering last year,

conducted the study at the European Synchrotron Radiation Facility in France when he was a postdoctoral researcher at The University of Oxford's Department of Materials.

The results of this research are open to the public and can be accessed at <http://rdcu.be/EziA>

## MUSEUM NEWS

### CANADIAN WARPLANE HERITAGE



[www.warplane.com](http://www.warplane.com)

### Exhibition - Great Posters from the Great War; Recruitment in Canada 1914-1918



At the outbreak of the First World War, the main form of communication in Canada was the newspaper. Posters were used as an advertising tool, most widely in Europe. Without a conscription policy, it was necessary to find other ways to convince Canadians to enlist. Recruitment posters quickly became prominent, promoting enlistment in the forces. During both World Wars, the large number of posters produced created a booming business for printing companies and graphic designers, whose efforts helped serve their country through Canada's most historic poster campaign.

*Great Posters from the Great War; Recruitment in Canada 1914-1918* illustrates the commendable effort that Canada devoted to the conflict and act as a pictorial example of how Canadian society evolved from the beginning of the war to its conclusion.

Exhibit ends June 17, 2018

### TORONTO INTERNATIONAL AEROSPACE

[formerly Canadian Air & Space Museum]

[www.casmuseum.org](http://www.casmuseum.org)

### Victory Aircraft Display



Until March 2018, please visit our "Victory Aircraft" display at Terminal 1 Arrivals, Pearson International Airport. Click [here](#) for more information.

### NATIONAL AIR FORCE MUSEUM OF CANADA



[airforcemuseum.ca](http://airforcemuseum.ca)

No current news.

CASI'S LOCAL



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