

Written Submission to  
the House of Commons  
Standing Committee on Finance



PRE-BUDGET CONSULTATIONS  
IN ADVANCE OF THE 2019 BUDGET

# Space Needs Canada

AUGUST 3, 2018



Canadian Space Society  
Soci t  spatiale Canadienne



## RECOMMENDATIONS

---

Recommendation 1: That the government provides the Canadian Space Agency with more funding to allow increased participation in ISS missions, recruit more astronauts, establish new research and operation centres and develop future projects of different scopes.

Recommendation 2: That the budget allows the CSA and partners to develop preliminary proposals for space-based green energy production and mining projects.

Recommendation 3: Indicate support for private space companies in Canada, procure services from the industry and encourage entrepreneurship.

Recommendation 4: Create and support comprehensive outreach programs to educate the public on the importance of space exploration.

Recommendation 5: That the government works closely with the experts in the field such as the Space Advisory Board, to adopt new space-related policies and strategies promptly.

Cover page background image credit: Canadian Space Agency

## ABOUT THE CANADIAN SPACE SOCIETY

---

The Canadian Space Society (CSS) is a federally-incorporated non-profit organization and charity. With many of Canada's top space professionals on board, the CSS is made up of enthusiasts of all backgrounds pursuing the exploration and development of space. Our principal objective is to sponsor and promote the involvement of Canadians in the space sector, through its technical and outreach projects including regular chapter meetings, the annual Canadian Space Summit and more.

Founded in 1983 and grown to six chapters in Vancouver, Calgary, Winnipeg, Toronto, Ottawa and Montréal, the Canadian Space Society's primary goal is to provide meeting and working places to Society members for the purposes of discussion, presentation and development of space and space-related technologies. Our long-term vision is to lead Canada in the effective cooperation between industry, government, academia, advocacy groups, and the public for the advancement of space endeavours.

Our missions include:

- Inform our membership and the public (Canadian Space Agency, 2018) about Canada's activities in space within the context of the broader international community
- Educate on space exploration, discovery, innovation and its values.
- Engage our members through space-related projects, activities, and networking opportunities.
- Shape space policy, representing our membership and the public through activities that bring together members of the government, academia, and business.

The recommendations presented in this document are based on comments from CSS members, the 2017 consultation report from the Space Advisory Board (SAB) and several other sources, which will be listed at the end of this document.

## CANADA AND SPACE EXPLORATION

---

Space development and exploration have a significant impact on us in many ways. It is a field that continually challenges our minds to innovate newer and better technologies, helps to uncover the mysteries of the universe, brings conveniences to our everyday lives, and boosts both national and global economy. Space is also the theme in a large number of literature and entertainment products that stimulate our imagination and philosophical development.

Artificial satellites are the most commonly seen space products. With a wide range of sizes and functions, they provide data to help us monitor our home planet, communicate with others, navigate our trips and study other places in the universe. In 1962, Canada became the third country, after then-USSR and the United States, to design and build a satellite, Alouette 1.

RADARSAT Constellation Mission (RCM) is one of Canada's latest major satellite projects, scheduled to launch in November 2018. It consists of 3 identical Earth-observation satellites and will visit 90% of Earth's surface every day to provide high-quality data to the users.

In 1983, the first group of Canadian astronauts were selected through an invitation from the National Aeronautics and Space Administration (NASA). Following the creation of the Canadian Space Agency (CSA)

## Written Submission for the Pre-Budget Consultations in Advance of the 2019 Budget

in 1989, three more recruiting campaigns were launched. As of August 2018, a total of 14 CSA astronauts were selected, of which 8 of these extraordinary pioneers have participated in 16 space missions.

Dr. David Saint-Jacques is scheduled to visit the International Space Station (ISS) as a crew member of Expedition 58/59 in December 2018, becoming the first CSA astronaut onboard the station since Col. Chris Hadfield returning from Expedition 34/35 in 2013. Three other active CSA astronauts are receiving trainings for future missions. Retired CSA astronauts are also making tremendous contributions to serve Canada in various fields such as academic and medical researches, and governmental positions.

Other than the ISS, Canada is working with other agencies on several different missions. For example, in August 2018, NASA's OSIRIS-REx is expected to reach its target, asteroid Bennu, for a sample-return mission, of which a Canadian payload onboard the spacecraft will map the asteroid's surface.

Although space technologies sound irrelevant to many, numerous spin-offs have brought revolutionary changes to our lives. As one of the most iconic Canadian contributions to space missions, the technology of the Canadarm was used to develop the Image Guided Autonomous Robot (IGAR) that works inside an MRI scanner, to detect and treat early-stage tumours such as breast cancer, a disease that an estimated 24,400 Canadian women would have been diagnosed within 2014.

Space missions are often international efforts. The most famous example is the ISS, which hosted hundreds of visitors from almost 20 countries since its operation started in 1998. The CSA has been a long-time partner with NASA and European Space Agency (ESA), and as Canada is often praised for its multiculturalism, we may be at an advantage to establish new cooperative relationships, attract foreign investments and talents, and share technological advancements.

Many distinguished research institutions in Canada offer high-quality education in a wide range of fields, attracting both students and educators domestically and internationally. On the other hand, Canadians also make up a significant portion out of the some-4,400 alumni of the International Space University from more than 100 countries.

Canada is also fortunate to have a great number of commercial space organizations. Out of the reported \$3.5 billion domestic revenues in the space sector in 2016, 87% was from the non-governmental side. The total revenues of the sector in 2016 were \$5.5 billion, a 4% growth from the previous year, which was higher than the 2014-2016 period (about 1.36%).

## HOW CAN THE GOVERNMENT BUDGET HELP

---

Although Canada has had a positive image in the beginning of the space age, the lack of governmental support in recent years has resulted in less new job opportunities in the sector, and many were forced to seek permanent career development in other nations.

We applaud the federal government's decision on increasing funding for scientists and researchers in the 2018 budget to encourage more innovative researches being done in the country. **We would like to suggest the government to invest substantially more on space-specific projects, update space policies and**

strategies, and eventually create more career opportunities within the nation. This should be seen as a means of driving technological innovation and reducing Canada's dependence on resource extraction and manufacturing. It should also be seen as a means of promoting national unity and a sense of national purpose. Potential benefits from this budget can include, but not limited to, the following:

More CSA astronauts and ISS missions: Compare to other major space-faring nations such as the ISS agency partners, Canada has a lower number of active astronauts and often have to wait longer to be assigned a mission. Increasing the funding to recruit more astronauts (especially of diverse backgrounds) and/or to participate in more ISS missions will raise Canada's presence on the global stage.

Establish more CSA centres: CSA activities are still very limited, partly due to the current existence of only three branches. Establishing new research and operation centres, preferably throughout different parts of the country, will not only create hundreds or even thousands of jobs to keep our talents, opening them for visitors could generate additional income as well as provide educational information to the public.

Initiate new space science and application missions: As of August 2018, there are no new missions planned after launching the RCM. The future of the International Space Station is also uncertain. Without new missions, we are at risk to lose the existing expertise in the country. The SAB suggested introducing a mix of both long-duration (i.e. CSA's RCM, NASA's Apollo Program, ESA's ExoMars Program) and mid- to small-scale programs (i.e. for technology development), to meet the nation's needs in developing innovative technologies as well as to train aspiring students.

Invest technologies to support space mining initiatives: Space is filled with natural resources that could be used for future space settlements and/or brought back to support terrestrial life. Such resources include solar power, green energy sources such as Helium-3, minerals from asteroids and many more. As space mining becomes a focus in many national space agencies and commercial groups, developing related missions and technologies can attract both talents and significant investments.

Contribute to education: The Canadian CubeSat Project is a great example to encourage student participation in real-life space applications. In 2018, the CSA awarded grants to 15 Canadian universities to build their own CubeSats, and the winning team will get their cubesat launched and deployed from the ISS. The budget could also be used to create and/or enhance space-specific educational programs in post-secondary institutes, such as astrophysics, planetary science, aerospace engineering, space law, and space health science. In addition, a portion of the budget could be allocated as scholarships to award aspiring students to enrol in related educational programs and/or attending conferences and events.

Procure related services from commercial groups: As the SAB suggested, the government could procure services from the Canadian commercial space groups, to support the development of the industry, encourage entrepreneurship and reward those who achieve excellent results, which can lead to the creation of more job opportunities. For example, the CSA does not need to build rockets or launch facilities but can instead contract out these services to private companies.

## Written Submission for the Pre-Budget Consultations in Advance of the 2019 Budget

Create and support comprehensive outreach programs: The information gap between the industry and the general public on space development and exploration is yet to be bridged in a timely manner. Many non-profit organizations such as the CSS, SEDS Canada and the Royal Astronomical Society of Canada strive to gather members and create events to engage the interest of the public. Receiving some funding from the government will speed up the process to gain public support in developing the industry.

## CONCLUSIONS

---

Canada has a rich legacy in the history of space development but was noticeably less active in recent years. With the rapid growth of interest in space-related activities both domestically and internationally, and as a new Canadian space strategy will be revealed in the coming months, we strongly encourage the government to start increasing funding and support to revitalize Canada's space sector.

Proven to bring both direct and indirect improvements to the quality of our lives, investing in space will deliver long-term, steady benefits to the growth of economy and betterment of humanity.

The Canadian Space Society, along with many other groups and individuals, will always be ready to assist our country in exploring the Solar System and beyond.

Canadian Space Society

P.O. Box 70009 Rimrock Plaza PO

1115 Lodestar Road, Bldg E

Toronto, ON, M3J 0H3

[www.css.ca](http://www.css.ca)



## REFERENCES

---

Canadian Space Agency, 2018. *Canadarm*. [Online]

Available at: <http://www.asc-csa.gc.ca/eng/canadarm/default.asp>

[Accessed 1 August 2018].

Canadian Space Agency, 2018. *Canadian Space Milestones*. [Online]

Available at: <http://www.asc-csa.gc.ca/eng/about/milestones.asp>

[Accessed 1 August 2018].

Canadian Space Agency, 2018. *State of the Canadian Space Sector Report 2016*, Saint-Hubert: Canadian Space Agency.

Canadian Space Agency, 2018. *The OSIRIS-REx asteroid sample-return mission*. [Online]

Available at: <http://www.asc-csa.gc.ca/eng/satellites/osiris-rex/about.asp>

[Accessed 2 August 2018].

Canadian Space Agency, 2018. *What is the Canadian CubeSat Project*. [Online]

Available at: <http://www.asc-csa.gc.ca/eng/satellites/cubesat/what-is-the-canadian-cubesat-project.asp>

[Accessed 1 August 2018].

Canadian Space Agency, 2018. *What is the RCM?*. [Online]

Available at: <http://www.asc-csa.gc.ca/eng/satellites/radarsat/what-is-rcm.asp>

[Accessed 3 August 2018].

International Space University, n.d. *What is ISU?*. [Online]

Available at: <http://isunet.edu/blog/what-is-isu/85>

[Accessed 1 August 2018].

Space Advisory Board, 2017. *Consultations on Canada's future in space: What we heard*. [Online]

Available at: <https://www.ic.gc.ca/eic/site/ad-ad.nsf/eng/ad03996.html>

[Accessed July 2018].

The Canadian Minerals and Metals Plan, 2018. *Space Mining: Are We on the Cusp of an Asteroid Rush?*. [Online]

Available at: [https://www.minescanada.ca/en/content/space-mining-are-we-cusp-asteroid-](https://www.minescanada.ca/en/content/space-mining-are-we-cusp-asteroid-rush?utm_source=twitter&utm_medium=cmmp_organic_en&utm_content=cmmp_space_mining_article_july16&utm_campaign=yourcmmp)

[rush?utm\\_source=twitter&utm\\_medium=cmmp\\_organic\\_en&utm\\_content=cmmp\\_space\\_mining\\_article\\_july16&utm\\_campaign=yourcmmp](https://www.minescanada.ca/en/content/space-mining-are-we-cusp-asteroid-rush?utm_source=twitter&utm_medium=cmmp_organic_en&utm_content=cmmp_space_mining_article_july16&utm_campaign=yourcmmp)

[Accessed 16 July 2018].