

Students for the Exploration
and Development of Space



Étudiants pour l'Exploration et
le Développement Spatial

In collaboration with



Canadian Stratospheric Balloon Experiment Design Challenge

[CAN-SBX] 2017-2018

Request for Proposals

Release Date	September 21, 2017
Due Date – Letter of Intent	October 13, 2017
Due Date – Proposal	December 1, 2017
Contact Info	cansbx@seds.ca

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List of Acronyms

CDR	Critical Design Review
CSA	Canadian Space Agency
FRL	Flight Research Laboratory
NRC	National Research Council of Canada
PDR	Preliminary Design Review
RFP	Request for Proposals
SEDS	Students for the Exploration and Development of Space
SME	Subject Matter Expert
TBA	To Be Announced
TEDP	Test Equipment and Data Package

Project Overview

The Canadian Stratospheric Balloon Experiment Design Challenge (CAN-SBX) is a competition for Canadian post-secondary students to design and test a small scientific experiment to fly on board a High-Altitude Balloon provided by the Canadian Space Agency. The CAN-SBX program allows post-secondary students to develop different experiments in areas such as astrophysics, Earth atmosphere, Earth magnetic field, biology, remote sensing and technology demonstrations.

Any student team at a Canadian university or college may submit a proposal for their experiment, after careful consideration, 2 teams will be selected to fully design, build and fly their experiments. Three to Six students from each team will attend the 2018 launch campaign in Timmins Ontario.

SEDS Canada strives to create a tangible student-led impact in space exploration and development. This is a unique opportunity allows students to develop skills in STEM and conduct research in an environment that is unparalleled here on Earth.

Project Overview

The flight campaign will be held in early August of 2018. The flight will span the duration of approximately 10 hours, however flight campaigns can last on the order of several days, depending on weather dependent launch windows. Historically, most of the launch opportunities at the Timmins base have been between 4 pm and 8 am as winds are weaker at evening and night. The flight campaign will occur tentatively over the period of two weeks and will include the following:

- Registration
- Pre-flight briefings
- Experiment-gondola integration
- Flights
- Payload/gondola recapture
- Data analysis
- Reception

Eligibility, Funding & Timeline

All students at secondary and post-secondary institutions in Canada are eligible to enter this competition, however, the team leader and no less than 80% of the team must be enrolled at a post-secondary institution. Funding for travel and lodging will only be provided for students currently enrolled in a Canadian post-secondary institution. The two teams selected by SEDS-Canada and the Canadian Space Agency to access this flight will be eligible to apply for a grant to cover travel and accommodation expenses for the student team members and shipping costs for their experiment, tools and other ground support equipment. The selected teams will apply for the CSA grant provided they have a professor-advisor that can manage the grant. Expenses associated with experiment development, testing and integration cannot be included in the budget of the applicant's proposal. It is the responsibility of the recipient to comply with all of the safety procedures, and to ensure that the payload will be ready on time and meets safety and interface requirements, which are outlined in the SEDS STRATOS 2018 Handbook.

Students must adhere to the following timeline and requirements in order to qualify for the selection process:

- October 13th 2017, 11:59 p.m. - Submit your Letter of Intent with the following information:

- Team information - names, emails, majors, proof of enrolment.
- Endorsement of at least one faculty advisor at your institution.
- Brief summary of the proposed experiment. A \$50 security deposit which will be returned upon submission of your team proposal.
- December 1st 2017, 11:59 p.m. - Submit team Proposal.
- December 22nd 2017 - Teams will be notified of their selection and feedback will be provided by SMEs.

For selected teams:

- February 9th 2018, 11:59 p.m. - Submit your Preliminary Design Review (PDR)
- May 30th 2018, 11:59 p.m. - Submit your Critical Design Review (CDR)
- June 11^h 2018, 11:59 p.m. - Submit your Test Equipment Data Package (TEDP)
- August 2018- Flight campaign, dates TBA

The PDR, CDR and TEDP are documents that are required to complete milestones in a standard design process. These documents will be evaluated by SMEs throughout the experiment design phases.

Eligibility, Funding & Timeline

Experiments must:

- Be contained within a .387m [L] x .394m [W] x .260m [H]
- Weigh no greater than 12kg
- Constrain its peak power consumption no greater than 30W
- Be free of hazardous liquids and gases, including high-pressure, toxic, corrosive, explosive and flammable materials
- **Specifications regarding battery types permitted to be outlined in the CAN-SBX Handbook**

Proposal Guidelines

The CAN-SBX Handbook, a more detailed manual outlining our guidelines for submissions of proposals and all subsequent review documents, will be issued to the teams who have submitted their Letter of Intent and will be available on the SEDS-Canada Webpage under the CAN-SBX Project . However, a brief overview of a proposal outline is shown below.

Description of Experiment

The proposal must describe the topic of research that your experiment will focus on. Describe research objectives and questions, how your experiment will address them, relevance to past works in this field, novelty if any, metrics for success and challenges to execution.

Include a system-level diagram and/or CAD model that give a graphical overview of the experiment. Demonstrate that the experiment is subject to the physical constraints as outlined in the Experiment Constraints section of this RFP.

Risk Analysis & Mitigation

Both on the project management and experiment/technical level please describe the risks you foresee and strategies you will employ to mitigate the occurrence and limit the consequences of such risks.

Outreach & Dissemination Plan

An important part of this project is to inspire and engage students and disseminate results to both the general public and the research/academic community with the goal of increasing interest and retention of talent in space exploration and development. Points will be awarded to teams that actively present their work in this project to their community at any events such as public showcases, conferences etc., and to teams that actively involve high school students in the course of their project, from conceptualization and design to fabrication and testing.

Budget Forecast

Include a preliminary budget that predicts all foreseeable expenses in your project, and provide evidence of sufficient funding from present and future sources. Do not include the cost of the balloon or launch in your budget forecast. Points will be awarded to teams that can demonstrate financial stability and commitment to successfully execute the project.

Selection Criteria

The experiments will be selected based on a number of criteria, tentatively:

- a) Technical description (40%)
- b) Scientific merit and relevance to key strategy areas (30%)
- c) Budget & Funding Plan (15%)
- d) Outreach & Dissemination Plan (15%)

Criteria will be finalized in the CAN-SBX Handbook.

About SEDS-Canada

SEDS-Canada is a student-run non-profit organization in Canada dedicated to empowering students in the space industry and advocating for space in the public sphere. Our mission is to strengthen Canada's future in space by providing post-secondary students with unique projects, research programs, and professional development opportunities in the Canadian governmental, industrial and institutional space sectors. We work to develop pioneering projects such as CAN-RGX that give opportunities to students to learn key technical skills and participate in exciting and relevant experiences for their own professional development, and that allow us to contribute to the advancement of the space sector and Canada's competitiveness in the global space arena. To date we've provided 38 students with unique hands on experiences in business development and microgravity research.

About The Canadian Space Agency

The Canadian Space Agency (CSA) coordinates all civil, space-related policies and programs on behalf of the Government of Canada. CSA is committed to leading the development and application of space knowledge for the benefit of Canadians and humanity. The Agency has contributed to the advancement of space technologies, and provides expertise and personnel to the international space effort in collaboration with CNES, NASA, ESA, and other recognized space agencies.