Students for the Exploration and Development of Space

SEDS-ÉEDS CANADA

Étudiants pour l'Èxploration et le Développment Spatial

CAN-SBX

CANADIAN STRATOSPHERIC BALLOON EXPERIMENT

HOW-TO GUIDE

Visit seds.ca/projects/can-sbx for more information

www.seds.ca SEDS-Canada @sedscanada

Canadian Stratospheric Balloon Experiment (CAN-SBX) Design Challenge

PRE-COMPETITION

STARTING A TEAM

Use the following checklist and suggestions to help you start a team:

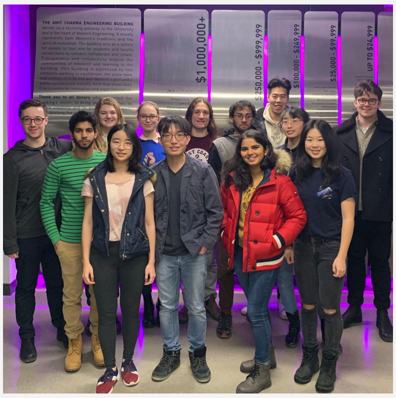
- ❑ Found a team
  - We recommend recruiting at least ***6 team members***
  - Look among your friends, at space teams/clubs at your school (check out your local club registry), and within engineering design teams, for example.
  - Consider diversifying your team (subject matter, year, etc). Including members from diverse backgrounds will help with technical and management aspects at all stages of the project, while including members from different years of study can help with continuation of the project past the competition.
- ❑ Establish regular communication
  - Find a communication platform: we recommend **Slack** or **Discord**
    - Here is a decent article comparing the two
  - Schedule frequent and recurring team meetings: we suggest a **weekly 1-hour meeting**, at minimum, to start with!
- ❑ Start thinking about a topic of interest
  - Talk to professors: professors are an underutilised resource, don't be afraid to ask them for advice! Collaborating on a research project helps with access to equipment, graduate student support, and even funding!
  - Find something that interests and excites the team. For example, do you all like medicine? Start searching for "medicine + stratosphere" in your school library or Google Scholar. Stratospheric balloon missions are also a great technology demonstration stepping stone towards satellite development!
  - Look at previous projects (refer to the next three sections of this guide)
- ❑ Look for a faculty advisor (you'll need one of these to apply)
  - These can be professors at any level, teaching staff, or principal investigators (PIs)
  - These cannot be PhD students or postdocs
  - It is good to work with your faculty advisor to refine your topic towards a research question or equipment demonstration!
- ❑ Find a space to work at your university
  - **Typically your faculty advisor can help with this!**
  - A study space will work in the beginning, but you should find ways to access equipment you'll need to actually execute your projet, if selected
  - Note that some universities have a dedicated space for engineering design teams
- ❑ Register as an official student club/design team on campus
  - This may not be applicable to everyone (and doing this is *not required* to participate in the CAN-SBX competition), but it may help with:
    - Funding for development of the project as well as travel funding,
    - Advertising your group to your peers & gaining more members,
    - Finding space to work within Student Union buildings,
    - Holding on-campus events, etc.
- ❑ Most of all: start looking at project proposal requirements!

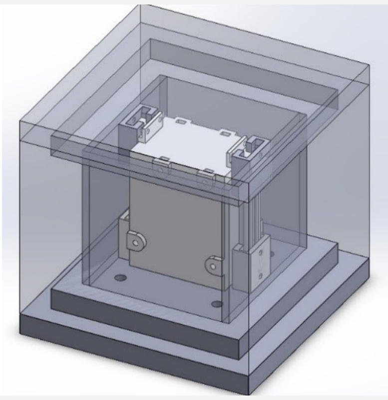
- Start looking at the requirements as early as possible
- Refer to the [Crafting a proposal] section of this guide

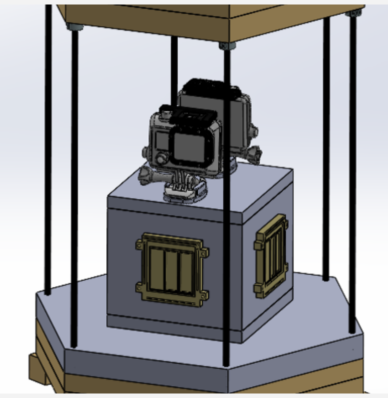
DEVELOPING AN IDEA - PAST CAN-SBX TEAM EXPERIMENTS

Western UBT (CAN-SBX 2019-20 Alumni)
The University of Western Ontario
# of Team Members: 19

UBT Ionizing Radiation Effects on Organic Compounds Experiment







The goal of the Western UBT high-altitude experiment was to measure the effects of ionizing radiation on organic compounds. Samples of Vitamins B1, B12, and C, under different treatments, were to be sent to the stratosphere along with several sensors. Following recovery of the payload, lab tests were to be conducted to measure structural and chemical changes in the samples.

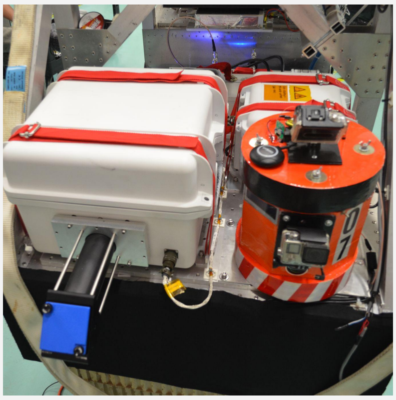
Technical summary
The payload included a polystyrene enclosure supported with an aluminium L-bracket frame to house samples and sensors. Arduino Uno connected to a data-logger shield was used as the main flight computer. Onboard sensors included BME280 sensor to measure temperature, pressure, and humidity, an IMU to measure acceleration and rotation, a GPS to record position, and a GoPro camera for images and video.

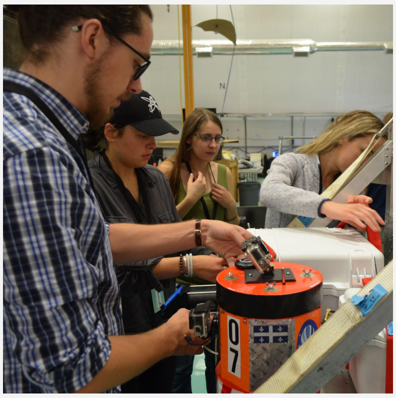
Lessons learned/advice for future teams
- Ensure early on that you have multiple funding sources to minimize risk of losing access to funds
- Recruit a dedicated team with clear roles and responsibilities
- Begin working on deliverables early on to avoid rushing near the deadline
- Set clear expectations and deadlines documented in a central location for the team to refer to

For more information about the team, check out their [Facebook page].

AlbertaSat (CAN-SBX 2017-18 Alumni)
University of Alberta
# of Team Members: 17

Multispectral Imager In-Situ Testing (MIST)





The University of Alberta is home to AlbertaSat, a student project group composed of mostly undergraduate students that develop cube satellites, perform high altitude balloon missions and run an extensive educational outreach program. The main payload of Ex-Alta 2 is a multispectral imager, designed and manufactured in house. Their CAN-SBX experiment was an in situ test of the Ex-Alta 2 multispectral imager payload. The primary mission objective was to confirm that the mechanical and electrical systems that make up the imager work together as designed in a space-like environment. Performing real-world tests on designs developed in-house provides a swath of information that can be overlooked in the earlier design phases of the project. This information can range in value from enhancing design performance to identifying causes of system failure. Since the multispectral imager is the sole scientific payload on Ex-Alta 2, this information not only affects the performance of the imager, but the success of the entire cubesat mission.

Technical summary
The payload included three cameras mounted in the multispectral imager. The images collected by the cameras were the main data collected in the experiment and were stored on a Raspberry Pi microcontroller during flight. A filter mounted on each camera prevented all light from entering the lens except for the specific band for each camera. Image quality was analyzed post-flight.

Lessons learned/advice for future teams
- Make sure to allow yourself to have fun!
- CSA and SEDS are there to support you, not to pick apart your designs or make you feel bad.

For more information about the team, check out their Instagram.

Here's a list of topics from all past CAN-SBX teams:

2017 - 2018

- Effectiveness of calcite aerosol in solar radiation management (University of Alberta)
- Technology demonstration of a multispectral imager payload (University of Alberta)

2018 - 2019

- Measuring the flux of subatomic particles, particularly muons and pions, at different heights to study the life cycle of cosmic rays in Earth's atmosphere (University of British Columbia Okanagan)
- Technology demonstration to sample bioaerosols in the upper atmosphere (Western University)

2019 - 2021

- Technology demonstration of a neutron dosimeter for spaceflight (McMaster University)
- Investigation of chemical degradation of common vitamins in the near-space environment (Western University)
- Technology demonstration of a low-cost commercial off-the-shelf attitude determination system using a camera to image the Earth's limb (Queen's University)
- Technology demonstration of an optical multi-gas sensor for extreme environments and a plant incubation system for a cubesat (Polytechnique Montreal)

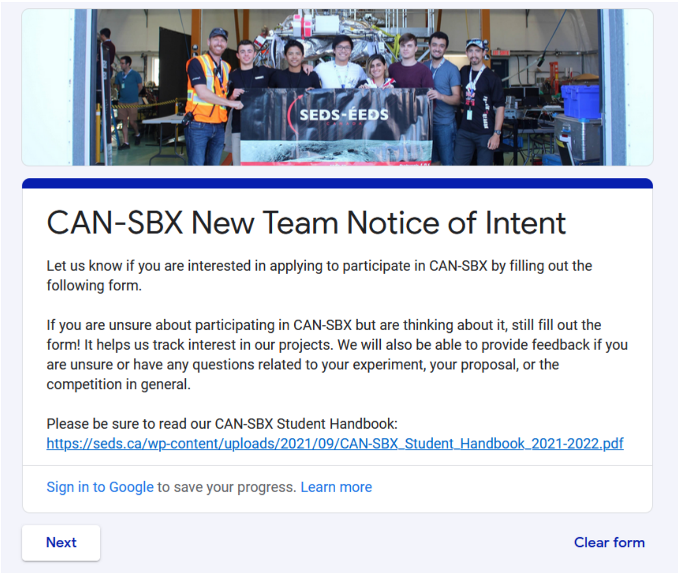
For more information, check out our past team feature bubbles (LINK)

SCOPING AND CONCEPT SELECTION

- Start with the goals - what are the scientific or engineering questions you want to answer
- Identify how you will quantify / measure these goal
    - This is the core of your design - the sensor systems
    - Be very specific about the performance requirements of your system (precision, resolution, measurement frequency, etc.) and any auxiliary constraints that are imposed (e.g. must be able to operate under X conditions)
- Identify all the supporting systems needed to operate your core sensors (e.g. power, structure, computers, communications, etc.)
    - Identify the performance requirements of each (e.g. power budget, link budget, etc.) and the constraints they must operate under
- Generally, multiple design options are created that meet the core performance requirements
    - There are many tools that exist for generating concepts - the simplest is just searching for existing systems
    - Assess your concepts based on your project requirements - mass, power needs, cost, procurement timeline, ease of manufacture/assembly, ease of operation, ease of integration, etc.
        - A weighted evaluation matrix is a common tool to assess a design using multiple criteria to subsequently select one

CRAFTING A PROPOSAL

The main resource for learning the rules, eligibility criteria, experiment constraints, and application criteria for CAN-SBX is the CAN-SBX Student Handbook, which can be found on the [CAN-SBX webpage](), or here: **[PDF]()**/**[Word]()**.



Once you have an idea for the experiment you'd like to perform in the stratosphere, express your interest in applying for the CAN-SBX Design Challenge via the Expression of Interest Google Form on the [CAN-SBX webpage]().

We'll be able to provide some limited feedback, e.g. if the experiment is feasible.

Our major piece of advice while applying to one of our projects: make sure to address every item in the Proposal Review Criteria! To help you with this we've created some Proposal templates:

[Proposal Template (Word)]()

[Proposal Template (Google Docs)*]()

*To edit the Google Docs version, sign into your Google account, then click File > Make a Copy

NOTE: The instructions found in these proposal templates are NOT exhaustive, and teams should be sure to read the accompanying Proposal Review Criteria table in the CAN-SBX Student Handbook to ensure they are fulfilling all proposal criteria.

QUESTIONS?

[Check out the CAN-SBX FAQ (LINK)]()

DURING COMPETITION

FUNDING YOUR PROJECT

University-level funding opportunities:

- Check funding opportunities offered by your faculty/department, including project and travel funding
- Check funding opportunities offered by Students' Union, especially for travel
- Reach out to your faculty/department with information about the project to ask if they are able to offer any financial or in-kind support (e.g. discount/access to machine shop or 3D printing services)

Canadian research/conference funding opportunities:

- Canadian Space Agency Flights and Fieldwork for the Advancement of Science and Technology (FAST) grant program
  - e.g. Announcement of Opportunity from 2021
  - These are typically open every 2 years in the Summer/Fall, and are specifically designed to support student training
- Canadian Space Agency International Astronautical Congress (IAC) funding
  - e.g. Announcement of Opportunity from 2021
  - These are typically announced annually
- Check Canadian Space Agency website for other funding opportunities
- NSERC Collaborative Research and Training Experience program
- SEDS-Canada hosts a CSS Summit Student Challenge for free entry & a presentation slot in the Canadian Space Society's annual summit. Check back at seds.ca for more information, or CSS's webpage for other, similar contests with partner organizations.

Corporate sponsorship & grants:

- Don't underestimate corporate sponsorship! Especially if you know of a company that could supply a specific part of your experiment.
  - Reach out to them with specific benefits for them in mind (e.g. posting their logo somewhere, making sure to mention them publicly in some way)
  - Corporate sponsorship doesn't have to be monetary! Some companies (including large lab suppliers like VWR, Sigma Aldrich, ThermoFisher, Texas Instruments) may offer in-kind contributions, free samples, and/or a discounted price for supplies you may need
- IEEE Foundation Grants and similar! Depending on your research topic, there's likely an organization or association related to it that supplies small grants.
- Local engineering organizations (e.g. PEO, APEGA) may have small grants or awards for student projects.

Fundraising:

- Organize a fundraising event
  - Organize an event and raise funds through selling admission tickets, raffle tickets, silent auction items, etc.
  - Reach out to local businesses to find a venue (some businesses might offer a venue for your event for free, e.g. local bars) or host your event at the university
  - Reach out to local businesses for silent auction item donations

- Run a fundraising campaign (e.g. GoFundMe)
    - Usually runs for at least a week and up to several months
    - Plan your advertising strategies and activities to engage people in your campaign
    - Avoid campaigns that are too long (e.g. several months), as it is important to keep up engagement
- Student fees
    - You may be able to convince your faculty to add a fee that each student pays as part of their tuition every year in order to fund your project. Typically students have the option to opt out of these fees.
    - Check to see what fees you paid → if there is an “Engineering Student Group Fund fee” or something similar already, figure out who is eligible to access these funds.
- Merchandise sales (team shirts, patches, stickers, etc.)
    - If you’re participating in CAN-SBX you likely have a team logo. Why not put these on merchandise and sell them for a small profit! Check out:
        - Redbubble (print on demand service that can deliver world wide, just upload your art)
        - Stickermule has great prices on stickers, especially. This is where SEDS-Canada sources stickers.
        - The/Studio has great prices on embroidered patches. SEDS-Canada gets patches here!

Feel free to reach out to us for fundraising ideas and/or to discuss your fundraising strategies.

ENGAGING RESEARCHERS & OTHER EXTERNAL PARTIES

Sometimes you need help with a particular part of your experiment, e.g. fabricating a specialty piece. We suggest you approach external researchers, manufacturers, or whomever with the knowledge that you are part of a student team working towards a huge goal & that you’d appreciate their help and advice. Many people are looking for opportunities like these to help the next generation of scientists and engineers.

If you’re looking to fill a specific need, and can’t quite find what you are looking for, give us a shout. We may be able to use our network to fill your needs.

PROJECT MANAGEMENT

Documentation:

- For a student team, it’s a balance between the workload of documentation and the amount of knowledge that can be passed down
    - Most effective is to make use of existing requirements (e.g. ESDP)
    - Pair documentation with other activities such as external design reviews or presentations to your faculty advisor - this creates incentive to have things to show them and ask questions about
    - Take time at the end of the year to compile emails and other communications
- The most common piece of documentation missing is “why” something was done/designed in such a way, not just “what’ the design was.

Meetings:

- Have a pre-set agenda that everyone has agreed to follow and stick with it

  - Helps to keep meetings efficient, while ensuring no points are missed
  - Check on key performance metrics (e.g. your gantt chart, budget, or design milestones)
  - Get updates from team members (e.g. especially if tasks were due)
  - Align on actions / next steps
- Take notes and keep them in an accessible place
- Assign action items and record those actions (e.g. in the meeting minutes) so you can track their completion
- Avoid the big "all hands" meetings unless it is to share some general news or update different subgroups of the team (e.g. present-out style) - groups of less than 6 are typically ideal for discussion meetings
- A good idea is creating a system to maintain accountability. A good accountability system should:
  - Be visible
  - Be frequently reviewed
  - Have a clear performance expectation set
  - Have an escalation plan to drive action

Timeline:

- Set aside time during midterms/exams! Be clear about expectations during holidays/reading week and be aware of key job search times.
- Plan for if/when someone leaves (including if it is temporary e.g. they are super busy for two weeks)
- Identify things that are time-sensitive (long lead time items, things that depend on other groups, etc.) → build your critical path around these major pieces
- Identify milestones and set reasonable expectations for achieving them
  - Start with a standard "1 week" to complete each major task - then extend or shorten times relative to each other to fit into your timeline, and highlight which tasks are "tight" on time (e.g. you needed to shorten it more than you were comfortable).
  - Be clear who is the owner that is ultimately responsible. They should also be aware of their expectations to deliver and plan accordingly to do so.
- Budget contingency periods throughout your timeline (e.g. a week every 2 months is contingency)
  - If you use one of your contingency periods - that should trigger some warning that you should reassess your timeline
- Prioritise your work
  - Use an urgent vs. important matrix to do so
- Use action registers, task lists, or detailed Gantt charts that you review regularly
  - Use a project readiness tracker inside your Gantt charts to provide a high-level overview of how each subsystem is progressing
  - Pre-define what it means to be "25%" or "100%" ready so that there is no ambiguity

Planning:

- Budget

    - Similar to timelines, be aware of times when you are expecting large inflows of money or large spending
    - Build in some contingency amount of spend for each project scope and re-evaluate your budget if you are dipping into your contingency
    - Have a plan in place if you do not get as much funding as you want or get extra
- Resources
    - Have a plan for onboarding and offboarding, and recruiting if needed
    - Have a plan for reaching out for additional experts/resources as needed and don't hesitate to ask for help!

TECHNICAL DESIGN

This section is NOT an exhaustive list of design best practises. However, it compiles common questions from past teams to share knowledge and learnings from previous design challenges.

Electrical:

- Generally non-resettable fuses are used since currents high enough to trigger the fuse will likely damage other components. Note that at lower pressures/temperatures, the current that a fuse trips at will be different.
- When designing PCBs it is important to use the correct trace width to avoid damaging circuits - online calculators can help with estimating trace widths. In space environments, treat external traces like internal ones when calculating their width and generally keep the maximum temperature rise to 10C.
- SnPb HASL is the typical standard PCB finish for space applications but ENIG is also acceptable. They are generally at a similar price point.
    - ENIG is better at handling fine-pitch components.

Structural:

- For metal components, generally aluminium is recommended because it is a light yet strong material.
    - Galvanised (zinc) coatings may off-gas and affect optics but this may not be a real concern for short flights.
- The mounting plate can be made from foams - they are surprisingly strong and lightweight, however, the main concern is shear at bolt holes. This can be minimised using washers and should be tested to ensure structural integrity.
- Access ports should be positioned on the sides of your payload rather than the top / bottom which may be obstructed once the payload has been integrated.

Thermal:

- When testing power systems note that at colder temperatures, batteries will have a lower capacity and below their minimum operating temperatures, they will not function. Insulation or a heater may be needed to stay within a reasonable operating range.

Safety & Operability:

- Using indicator lights on the exterior to signal various states (OK, error, etc.) is very helpful during integration and testing to recognize issues.
- Putting instructions for turning on/off, reading indicators, and integration/deintegration directly on the exterior helps the crew greatly when handling your payload.

Testing:

- Leveraging components that have flight heritage can simplify your testing requirements
- If there are concerns about component functionality at low temperatures, there are generally three ways to approach their design:
    - Use components with flight heritage and proven performance to avoid testing
    - Use specifically designed components for flights
    - Conduct thermal testing in a TVAC chamber (or at least a freezer) to verify performance

EFFECTIVELY COMMUNICATING YOUR WORK

Resources for creating beautiful graphics, slides, or other visual elements:

- **Diagrams.net** - free software for creating flowcharts and other diagrams
- **SlidesGo** - free Google Slides templates & elements
- **Beautiful.ai** - presentation maker

Some tips when building slides:

- Put your key takeaway as your slide title, e.g. instead of just "mechanical design" try "mechanical design is on track to meet mechanical requirements" or even more simply "Mechanical Design: On Track"
- Keep in mind the *goal* of your slide - what do you want your audience to take away from your slide? Put content that is not directly relevant to your key message into your appendix.
- Provide enough information for a reader to understand if they are referring back to your slides
- Use callout boxes or other text to provide context - use font sizes and colours to direct attention to the *important conclusions* (bigger) vs. *contextual information* (smaller)
- Tables, block diagrams, graphs are great (much better than plain old bullet points)
    - Put some thought into how you display data to best convey your point - different diagrams can be better or worse at conveying your conclusions
- Stats in word form are difficult to read. A graph or chart helps, a visual image is even better
- Use appendix slides for detailed content, or be ready to share your screen (e.g. if you want to ask about or show off a CAD model)

Interesting resources to learn more about effective communication:

- The Minto Principle/Pyramid Principle to convey information effectively
- Brown University's Quick Guide to Science Communication

MANAGING RISK

Common shortcomings in student team risk management:

- Not being thorough in identifying risks (programmatic, operational, financial, regulatory, interface risks)
- Not having a pre-defined, objective metric of risk (consequence and likelihood)
- Not understanding how to mitigate risk (e.g. depending on policy rather than inherent design, or relying on mitigation when elimination is possible)
- Not reviewing risks on a regular (e.g. twice a semester) basis
- Not following through on mitigations
- Being unaware of the velocity of risks (e.g. only starting to perform sponsorship outreach once your funding is low rather than earlier)

- Not identifying opportunities to pursue (e.g. if you do well at a competition, make a plan to use the publicity to gain access to resources for next year) in parallel with the threats to mitigate

Ways to avoid these pitfalls:

- Having a predefined risk management process, including clear metrics for risk that are multi-faceted (e.g. a HIGH consequence is something that: costs over $1000, injures at least one person requiring first aid, and/or delays a milestone by over 2 weeks)
- Assigning owners to risk categories during the identification process to help focus the group (e.g. person A is responsible for thinking of any financial risks, person B is responsible for technical risks on the mechanical design, etc.)
- Assigning owners to manage risks
- Actively de-prioritizing risks that do not need resources dedicated to managing them
- Review risks as a group and set aside the time (2-3 hours) to review them all, assign actions, and agree on the process for managing the risks going forward
- Reaching out to more experienced groups to audit your risk analysis!

Want to take your risk management to the next level, check out this risk register:

Risk Register (Google Sheets)*

*To edit, sign into your Google account, then click File > Make a Copy

OUTREACH

- Determine the goal(s) for your outreach. For example:
  - Would you like to engage members of the public in your project?
  - Would you like to communicate general concepts related to your project to the general public?
  - Would you like to highlight the importance of space exploration?
  - Would you like to engage members of the public in STEM activities?
  - Would you like to inspire the next generation of scientists/engineers?
- Determine the audience for your outreach activities
  - E.g. high school students, general public
- Design activities to meet you outreach goal(s) and be suitable for your target audience
  - Hands-on, engaging activities are usually better than a PowerPoint presentation
- Reach out to potential collaborators
  - Reach out to the local science centre to see if your team can participate in the upcoming activities
  - STEM outreach organizations, e.g. Let's Talk Science
- Keep records of conducted outreach activities
  - How many people attended
  - What was the primary audience
  - Did you receive any feedback

POST-COMPETITION

PRESENTING YOUR RESEARCH

We encourage you to present your research findings post-competition. A list of potential conferences/events to consider is included below.

Present at your school:

- Undergraduate Research Symposium (check your university website for dates/more information)
- Host an event to present your research to members of the university community
- Check for opportunities to present with your local space club and/or design teams

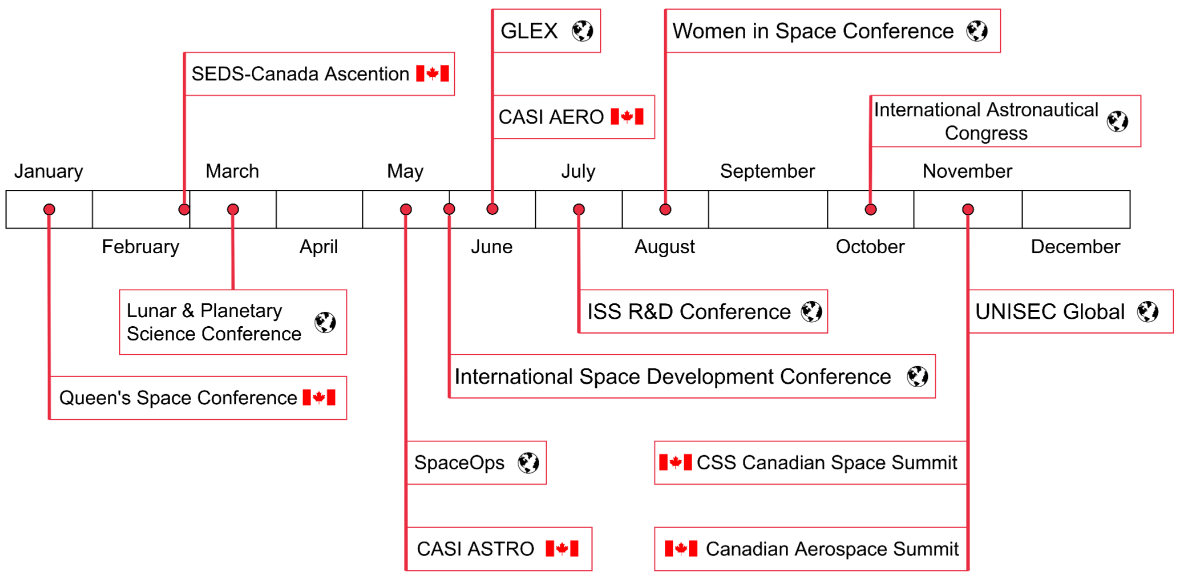
Present in Canada:

- **SEDS-Canada Ascension Conference**
- Canadian Space Society (CSS) Canadian Space Summit
  - SEDS-Canada usually has funding opportunities available!
- Queen's Space Conference
- Canadian Aerospace Summit
- ASTRO: Astronautics conference of the Canadian Aeronautics and Space Institute (CASI)
- AERO: Aeronautics conference of the Canadian Aeronautics and Space Institute (CASI)

Present internationally:

- International Astronautical Congress
  - Note that the CSA has funding opportunities available!
  - Common sessions applied to by CAN-RGX teams:
    - A1.8 - Biology in Space
    - A2.2 - Fluids and Material Sciences
    - A2.3 - Microgravity Experiments from Sub-orbital to Orbital Platforms
    - A2.7 - Life and Physical Sciences under reduced gravity
    - E2.3-GTS.4 - Student Team Competition
- SpaceOps
- Global Space Exploration Conference
- Women in Space Conference
- International Space Development Conference
- ISS R&D Conference
- UNISEC-Global
- Lunar and Planetary Science Conference

Conferences Timeline



Tips for presenting your research

- Read abstract/manuscript/presentation instructions carefully
    - Requirements can differ for different conferences
- Know your audience
    - Make sure your presentation can be understood by a diverse/multidisciplinary audience
- Focus on the big picture and avoid complicated technical details
    - What motivated your research project? What need was your project addressing? What problem did your project aim to solve?
    - Describe key details about your experiment
    - Summarise key results/outcomes of your experiment
    - What is the significance of your research?
- Use more visuals and less text

If you would like feedback on your conference abstract/manuscript/presentation before submission, you can submit a peer-review request to SEDS-Canada **here**.

PUBLISHING YOUR RESEARCH

We encourage you to publish your research findings post-competition. In addition to publishing the results of the experiment, the design/optimization process can also be published in engineering and education journals (e.g. ways to design a payload on low-budget, build-buy decisions as a student team, risks and mitigations during the design process on a student project). Document the design process well and reflect on the process to tie it into your engineering education. A list of potential journals to consider is included below.

Conference Proceedings:

- Many conferences require you to submit a manuscript, which is published in the conference proceedings
- These are typically not peer-reviewed publications
- *E.g. IAC, SpaceOps, GLEX, Canadian Space Society (CSS) Canadian Space Summit*

Student Journals:

- *Canadian Journal of Undergraduate Research*
- *Journal of Undergraduate Research in Alberta*
- *Journal of Student Research*
- Check if there are any journals published by your university
    - *E.g. University of Toronto Journal of Undergraduate Life Sciences, McMaster Journal of Engineering Physics, McMaster Undergraduate Science Journal*

Peer Reviewed Journals:

- Microgravity journals
    - *npj Microgravity; Microgravity Science and Technology*
- Space-related journals
    - *Acta Astronautica; Journal of Aerospace Engineering*
    - *Journal of Space Weather and Space Climate; Journal of Spacecraft and Rockets*
    - *IEEE Aerospace and Electronic Systems Magazine; Advances in Space Research*
- Field-specific journals
    - *Astrobiology*
    - *Life Sciences*
    - *Cellular and Molecular Life Science*

- *Fluid Dynamics*
- *Physics of Fluids*
- *Experiments in Fluids*
- *American Journal of Physics*
- *Journal of Applied Physics*

If you would like feedback on your manuscript before submission, you can submit a peer-review request to SEDS-Canada **here.**

CONTINUING YOUR RESEARCH

Depending on the subject matter behind your experiment, there are likely many opportunities to continue your research on another stratospheric balloon flight, or as a graduate studies project.

Other opportunities

- CSA's STRATOS program
- CSA's FAST Grant can fund additional stratospheric balloon flights as well as the following platforms:
  - Blue Origin's New Shepard suborbital rocket
  - Virgin Galactic's SpaceShipTwo suborbital spaceplane
- Propose your experiment to a local Student Group which builds sounding rockets, such as:
  - UBC Rocket,
  - UVic Rocketry,
  - Waterloo Rocketry,
  - Space Concordia,
  - SOAR,
  - And others! Good resources to find student teams participating in rocket launch competitions are the Intercollegiate Rocket Engineering Competition (IREC)/Spaceport America Cup or the Launch Canada Competition webpages

Graduate studies

Turn your project into a grad school project

- Discuss turning your project into a grad school project with your team's faculty advisor (they are already familiar with the project and likely do relevant research)
- Search for other labs/researchers working in a related field and/or doing space applications research
- Reach out to prospective supervisors to discuss your project (bring some ideas of where you see the project going as part of your grad studies)

Resources to find potential supervisors:

- Western Institute for Earth & Space Exploration
- Canadian Space Ambassadors

If you were demonstrating a technology during your flight, you should think about whether or not that technology can be commercialised. A good starting point is our Young Space Entrepreneurs (YSpacE) Competition.

Join the SEDS-Canada Alumni Group!