

Name: Frederic Seguin

Code: 691

Home institution: Catholic University of America

Name of task: Isotopic Enrichment of Meteoritic Organics (691.006)

Role in task/ what do you do for CRESST



I work at NASA's Goddard Space Flight Center in the Astrobiology Analytical Laboratory (AAL) as an astrochemist. Most of the work done at the AAL is about the detection of organic molecules in extraterrestrial samples, such as meteorites and lunar rocks. Understanding how those molecules formed throughout the Solar System history can provide us with clues to understand how life developed on Earth. A lot of my days are spent in the lab, working with analytical instruments, and preparing samples for their analysis. I specialize in gas chromatography and mass spectrometry, two analytical techniques that when put together, can allow us to identify and quantify the molecules we are targeting.

Background/ Autobiography

I am from Montreal, Quebec, Canada. As a native French speaker, most of my education was done in Quebec's French school system. After high-school, I studied social sciences and literature before eventually settling down in chemistry. I graduated from the Ahuntsic College in Montreal (2008) with a technical degree in analytical chemistry and immediately started working as a technician at the Montreal Anti-Doping Laboratory. I later obtained my bachelor's degree in chemistry (2014) from the Quebec University in Montreal and master's degree (2021, also in chemistry) from Concordia University. The subject of my thesis – which was highly influenced by my work in the field of anti-doping sciences – was about the use of carbon stable isotope ratios to help detect the presence of a prohibited substance in athletes' urine samples. All this experience eventually allowed me to start a new position in the AAL in September 2022.

Favorite part of being a CRESST Scientist

Working at NASA! This has always been a dream for me. I also like to be able to meet people from all over the world and the uniqueness of the samples we analyze.

Highlight of research as a CRESST Scientist

Sample-return missions are a major highlight in the research we do in the AAL. The mission we are currently working on is OSIRIS-Rex, which will bring back to Earth a sample of an asteroid named Bennu in September 2023 after a 7-year journey. Because the samples from those missions are so precious, my lab has spent a lot of time in the last years preparing and demonstrating it is ready to analyze them. In the last months, I have been working on a custom-made device that was designed and built to analyze volatile molecules in extraterrestrial samples. We are now planning to use it to analyze a sample from Bennu, something I'm really excited about!

Invited Talks

Annual conference on the Career Path of a Lab Technician, Ahuntsic College, Montreal (2016-2021)

Conference Talks

José C. Aponte, **Frédéric Séguin**, Ariel J. Siguelnitzky, Jamie E. Elsilá, Daniel P. Glavin, Jason P. Dworkin, Harold C. Connolly Jr., and Dante S. Lauretta, *“Studying meteoritic volatiles using Cuernavaca-X”*

- Oral presentation at the 2023 Advances in Stable Isotopes Techniques and Analysis, Ottawa, ON, Canada

Frédéric Séguin, *“Implications of isotopic correction to account for derivatization of small non-volatile molecules”*

- Oral presentation at the 2019 Advances in Stable Isotopes Techniques and Analysis in Winnipeg, MB, Canada

Frédéric Séguin, Karine Lalonde, Yves Gélinas, Christiane Ayotte, *“A novel method for the determination of the origin of urinary AICAR by GC-C-IRMS”*

- Oral presentation at the 2019 GEOTOP Meeting, Orford, QC, Canada

Conference Proceedings

Lalonde K, LeBerre N, Ouellet A, **Séguin F**, Ayotte C., 2015. From cleanup and analysis to data compilation: carbon isotope ratio determination of 19-norandrosterone origin in athlete's urine samples. Recent Advances in Doping Analysis (23). Proceedings of the Manfred Donike Workshop 33rd Cologne Workshop on Dope Analysis, p. 157-160.

Ouellet A, Lalonde K, LeBerre N, **Séguin F**, Ayotte C., 2015. Two-dimensional purification of low concentration analytes in urine for carbon isotope ratio analysis. Recent Advances in Doping Analysis (23). Proceedings of the Manfred Donike Workshop 33rd Cologne Workshop on Dope Analysis, p.37-44.

List of awards won

- Moire Anne Wadleigh prize in Stable Isotope Science, Advances in Stable Isotopes Techniques and Analysis (ASITA), Best Student Presentation (2019)
- 2019 GEOTOP Student Congress, 2nd Best Oral Presentation (2019)
- Quebec Research Funds – Nature and Technologies Scholarship (2018)
- Hydro-Quebec Excellence Bursary (2017)
- Natural Sciences and Engineering Research Council of Canada Graduate Scholarships, Master's Program (2017)
- Dean's List, *Université du Québec à Montréal* (2014)
- *Université du Québec à Montréal's* Chemistry Department Scholarships (2013 and 2014)
- Stablax Excellence Award, Ahuntsic College (2007)