

# SENTINEL NORTH RESEARCH CHAIR IN AQUATIC ENVIRONMENTAL GEOCHEMISTRY

Faculty of Science and Engineering

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## MISSION

The Sentinel North Research Chair in Aquatic Environmental Geochemistry aims to understand how element cycles are affected by current environmental changes and what impact these changes have on water quality.

This environmental chemistry research program aligns with Université Laval's current strategic initiatives and, more specifically, with those of Sentinel North.

CHAIR CREATION: February 19, 2018

## BACKGROUND

Among the complex issues facing the changing North, researchers are paying particular attention to the interrelations between different systems that are disrupting the northern landscape and ecosystems. Carbon released by melting permafrost is one of the largest sources of climate feedback. But its future role is hard to quantify, which limits the accuracy of climate projections.

This project is built around the hypothesis that climate change will transform northern aquatic ecosystems into carbon "hotspots", causing positive climate feedback. Lentic water bodies such as thaw ponds, thermokarst ponds, and lakes play a key role in the carbon cycle in the Arctic. The Chair's research will help provide a deeper understanding of what happens to carbon in these water bodies and will develop new modelling tools to improve understanding of the factors that control water quality.

## CHAIRHOLDER

**Raoul-Marie Couture** has been a professor in the Department of Chemistry at Université Laval's Faculty of Sciences and Engineering since February 2018. Mr. Couture has extensive research experience, especially in the field of aquatic geochemistry. He began his graduate work at the INRS Eau Terre Environnement Research Centre in Québec City, continued his research at the CNRS in Marseille, and completed a postdoctoral fellowship at the Georgia Institute of Technology in Atlanta. While working as a research assistant professor in ecohydrology at Ontario's University of Waterloo, he joined the Norwegian Institute for Water Research (NIVA) in 2013. Through his various research activities in the field of ecosystem chemistry, he has built a solid international network that will be of great value to his research chair.





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## OBJECTIVES

- > Understand the feedback between current environmental changes and biogeochemical cycles, coupled with the carbon dynamics in the aquatic environment.
- > Improve international cooperation in the study of the boreal and arctic zones.
- > Quantify the controlling factors and intensity of coupled biogeochemical cycles, for which carbon dynamics are an important driver, and integrate knowledge acquired using predictive models adapted to arctic ecosystems in transition.
- > Test the hypothesis that climate change will have repercussions on the flows and biological and photochemical reactivity of aquatic organic carbon due to the increased influx of terrestrial carbon.
- > Verify the mechanisms that link the observed increase in reactive carbon inputs into aquatic ecosystems with the increase in carbon flows into sediments, the atmosphere, and coastal environments.

## PARTNER

Funded by the Canada First Research Excellence Fund, Sentinel North allows Université Laval to draw on over a half-century of northern and optics/photonics research to develop innovative new technology and improve our understanding of the northern environment and its effect on human beings and their health. This Chair is part of the major transdisciplinary research program at Sentinel North whose mission includes training the next generation of researchers that will help address some of the complex challenges facing the changing North.

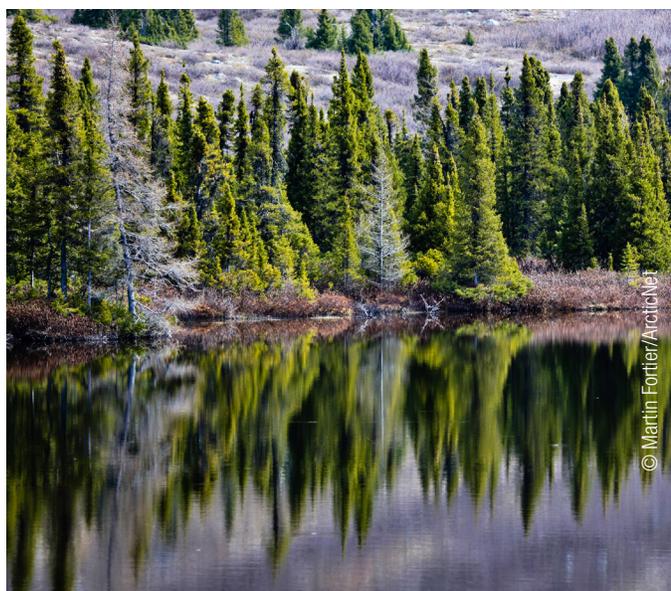
The Sentinel North Research Chair in Aquatic Environmental Geochemistry will contribute to this endeavour in many ways, including by developing a research lab in Université Laval's Department of Chemistry, which will train chemists with expertise in environmental and water science. Those chemists will help improve understanding of element cycling in northern aquatic environments.



## BENEFITS

The Chair will bolster Sentinel North's position as a leader in northern studies by collaborating with other interdisciplinary initiatives underway in the program, at the university, in Canada, and abroad. The expertise developed in environmental and water science will offer an extraordinary opportunity for Sentinel North to have an influence at the local, national, and international levels in this strategic area. Both government and industry are in great need of specialists in this field, as evidenced by the success of other environmental chemistry programs in Canada.

The creation of an additional collaborative research platform will also strengthen Université Laval's leadership position in northern environmental science. By emphasizing water quality, the Chair will bolster our efforts toward internationalization, and take advantage of industry and government partnerships.



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### INFORMATION

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