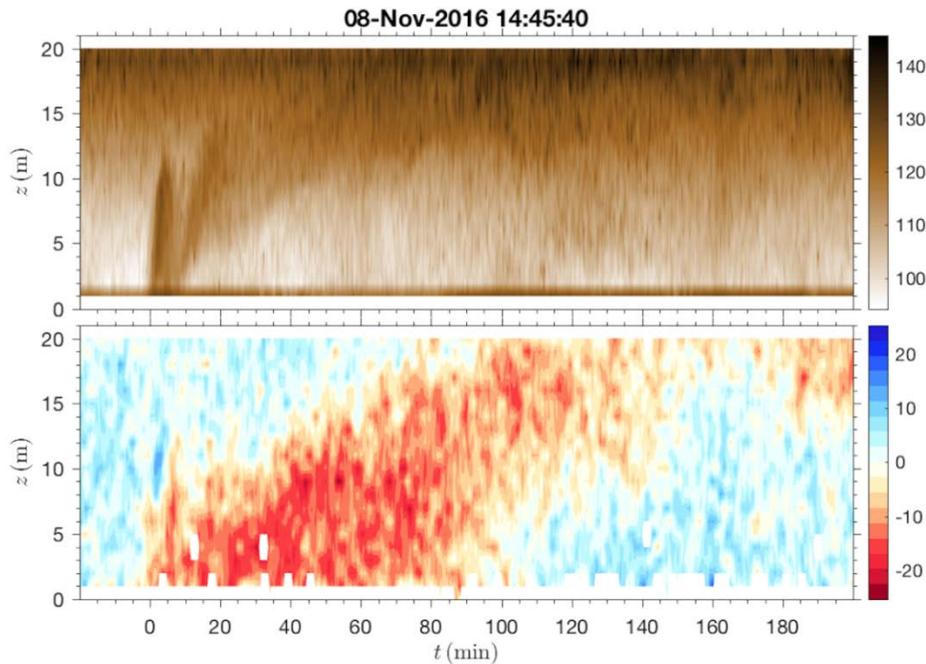


## Hydrodynamic and sediment transport in the Pointe-des-Monts submarine canyons (Quebec, eastern Canada)

Daniel Bourgault (UQAR-ISMER; supervisor), Urs Neumeier (UQAR-ISMER, co-supervisor), Alexandre Normandeau (Geological Survey of Canada - Atlantic, co-supervisor)



Example of an internal tidal bore observed in one of the canyons off Pointe-des-Monts. (top) Acoustic backscatter that suggests sediment re-suspension and transport and (bottom) associated horizontal currents in cm/s.

We are looking for a M.Sc. student with a background in physics or geophysics to study some fundamental aspects related to the hydrodynamic and sediment resuspension in submarine canyons. More specifically, we are particularly interested to study two phenomena that occur at two different temporal scales: 1) internal tidal bores and 2) turbidity currents (underwater sediment avalanches). 1) Internal tidal bores are sudden ( $< 60$  min) and repeated (every tide) occurrences of strong ( $\sim 20$  cm/s) up-canyon flows that are characterized with unstable and turbulent stratified waters. These internal bores are physically analogous to tidal bores than can be seen on some tidally-energetic rivers, as for example in the Bay of Fundy, except that they occur internally, at depth, within the water column and along canyon bottoms. These internal bores are also suspected to be an important source of sediment resuspension and transport. We already have acoustic evidence from Acoustic Doppler Current Profiler data on the existence of these internal bores that need to be further analysed. 2) Turbidity currents in the Pointe-des-Monts canyons occur much more rarely than internal bores, perhaps once a year or less, but are much more energetic events transporting sediments and reshaping the seabed. A few of these turbidity currents have already been documented during storms but there is still a lack of understanding of what causes them (storm waves, internal tides, sediment supply, particular current configuration, etc.) such that more research is required on this front too. The student recruited as part of this M.Sc. project will have the opportunity to participate in at least one oceanographic campaign in the St. Lawrence Estuary aboard the R/V Coriolis II, as well as attending national and international scientific meetings.

## **EXPECTED STARTING DATE**

Fall 2020 (September) or winter 2021 (January) at the latest.

## **STUDY PROGRAM**

Master program in Oceanography from *Institut des sciences de la mer de Rimouski* (ISMER) at the *Université du Québec à Rimouski* (UQAR), Rimouski, Québec, Canada.

For more information on the Master in oceanography at ISMER:

<https://www.uqar.ca/etudes/etudier-a-l-uqar/programmes-d-etudes/3615>

For more information on ISMER (<http://www.ismer.ca/?lang=en>), UQAR (<http://www.uqar.ca/english/>) and Geological Survey of Canada (<https://www.nrcan.gc.ca/science-data/research-centres-labs/geological-survey-canada/17100>).

## **SCHOLARSHIP**

For this project, a scholarship of 18 300 \$CAN/year is available for 2 years.

A tuition exemption program is also available to cover the extra tuition fees of international students:

<https://www.uqar.ca/services/services-a-l-etudiant/aide-financiere/programme-d-exemption-des-droits-de-scolarité-supplémentaires-exigés-des-étudiants-étrangers-de-l-uqar>

To get an idea of the cost of studying in Rimouski, please visit this website:

<http://services.uqar.ca/SimulationFrais/>

## **DESIRED QUALIFICATIONS**

The candidate will have a BSc degree in Physics or Earth Sciences (oceanography, geophysics, geology, geological engineering, or a related discipline) and some experience in hydrodynamic and sedimentology. The candidate should also satisfy the basic admission requirements of UQAR-ISMER for the Master program in Oceanography. Applicants must be proficient in both written and oral French and English.

## **HOW TO APPLY**

Please send all the documents listed below in one PDF file to Daniel Bourgault

([Daniel\\_Bourgault@uqar.ca](mailto:Daniel_Bourgault@uqar.ca))

- 1) Cover letter;
- 2) CV;
- 3) All university transcripts;
- 4) A list of practical and technical skills;
- 5) Names and contact information of two potential referees.

Review of applications will begin now and continue until the position is filled.

We welcome applications from all qualified students. We encourage women, First Nations, Métis, Inuit, members of visible or cultural minorities, LGBTQ and all who may contribute to further diversification of research approaches, ideas and group dynamics.