

Remote sensing and large-sample hydrology applied to river morphodynamics

Record number : OPR-1406

Overview

RESEARCH DIRECTION

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ADMINISTRATIVE UNIT(S)

Faculté des lettres et sciences humaines
Département de géomatique appliquée

INFORMATION

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LEVEL(S)

2e cycle
3e cycle

LOCATION(S)

Campus principal

Project Description

Subject description:

Alluvial rivers are inherently mobile, re-arranging their channels through incremental lateral migration and width adjustment, or more rapid processes such as cutoffs and avulsions. Much has been learned about the controls on river mobility, including hydrological, sedimentary, and vegetation drivers. Moreover, the coupling of satellite remote sensing with cloud-computing and large-sample statistical and ML approaches to river science have enabled us to measure river mobility and explore its drivers at regional or even global scale. Nonetheless, there remain numerous open questions relating to the influence of hydroclimate extremes on river adjustment, the remote sensing methods to quantify river mobility, and the relative importance of different river mobility controls across landscapes and climates.

General objectives:

I am seeking to MSc or PhD students who are interested in river responses to hydro-climate extremes and remote sensing of river morphodynamics. General topics of interest could include:

- Satellite remote sensing of river mobility and/or geomorphic change
- Large-sample hydrology and/or explainable AI approaches to hydrology, particularly in relation to fluvial geomorphology and/or remotely sensed river morphodynamics
- Experimental or field-based investigations of geomorphically-effective floods

Students with a proposed topic that does not fit within the categories above, but is relevant to my previous work, are encouraged to email me first to check if I'm still interested in the subject.

Key words:

Fluvial geomorphology, lateral river mobility, geomorphically effective floods, satellite remote sensing, Google Earth Engine, large-sample hydrology, explainable AI, experimental geomorphology, programming in R and Python

Team and work environment:

The student will join my research group in river studies at the Département de géomatique appliquée, Université de Sherbrooke, Québec, Canada. There are multiple opportunities for collaboration with researchers in remote sensing, geomatics, and engineering at UdeS, as well as with external collaborators in river morphology and hydrology. Students conducting field work will have access to drones, GNSS, ADCP and other survey equipment needed for geomorphic change detection and river monitoring, while those using experimental methods in

collaboration with the Département de génie civil et génie du bâtiment will have access to Sherbrooke's Outdoor Experimental River Facility (OERF). Sherbrooke itself is a university city with affordable housing, good food, and great access to nature.

Profile sought:

- Strength in river dynamics and/or fluvial geomorphology
- Background in geography, geology, environmental science, engineering, or a related discipline
- Expertise or a strong interest in remote sensing and GIS
- Expertise or a strong interest in explainable AI and/or “large-sample” statistical approaches to hydrology and/or geomorphology
- Expertise or a strong interest in programming in R or Python
- Great communication skills, both written and verbal

How to apply :

Interested candidates should submit :

- A 1-2 page proposal (a third page for references is accepted) in French or English, outlining a proposed Masters or PhD project linked to one of the three objectives above. The proposal should include relevant background literature, a clear rationale, a brief outline of the proposed methods, and a list of the 1-2 (MSc) or 3-4 (PhD) main research questions that will be addressed. Each of these should correspond approximately to one publication.

Note that I am not interested in reading AI-generated proposals: I don't want to know what AI thinks is a good research idea. I want your opinions on what you find interesting/important based on your interpretation of the literature!

- CV
- University transcripts
- Writing sample e.g. first-author publication, thesis, or project
- Code sample
- For MSc applicants: the scholarship details above
- Two academic reference letters and/or contact details for two referees.

Discipline(s) by sector

Funding offered

Sciences naturelles et génie

Yes
20k (MSc); 24k (PhD); only in-province (Québécois) tuition is covered .

Eau et environnement, Géomatique

The last update was on 29 May 2026. The University reserves the right to modify its projects without notice.