



Master 2 internship 2023:



Dissolution Rivers

Keywords: Macroscopic Physics, Fluid Mechanics, Geomorphology, Morphogenesis, Chemical Physics
Internship location : Laboratoire MSC (Matière et Systèmes complexes). Université Paris Cité.

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The M2 internship can start from January 2023 and can be funded.
The internship may be followed in a PhD Research project starting in fall 2023.

Subject: The rivers are usually created by the mechanical erosion of a sedimentary bed made of grains. The shape of the river is explained by the hydrodynamic transport of grains. When the bed is made of a soluble mineral, such as limestone, chemical erosion plays a similar role (karstic systems). Again, this process is controlled by the flow that transports the of the solute. It can also form localized channels [1], which have been little studied from the point of view of morphogenesis. In this internship, we propose to investigate the generation of dissolution channels in the laboratory using fast dissolving materials like salt, sugar or plaster. For a localized injection of water, we will study the formation and the shape evolution of the channel as a function of the hydrodynamic parameters. This project will complement our previous study with a homogeneous injection of water. In that case, we reported the generation of parallel dissolution grooves created by a thin flowing water film [2]. Using these laboratory experiments, we will propose erosion models that represent the emergence, and later evolution, of rivers at various scales. In the longer term, the creation of rain dissolution models will be studied in the laboratory by adapting the experimental setup to approach the field situation.



References:

- [1] *Karst Rock Features, Karren Sculpturing*, edited by A.Ginés, M. Knez, T. Slabe, and W. Dreybrodt (Karst Research Institute, Zalozba ZRC, Ljubljana), (2009)
- [2] A. Guérin, J. Derr, S. Courrech du Pont and M. Berhanu, *Streamwise dissolution patterns created by a flowing water film*. **Physical Review Letters**, 125(19), 194502 (2020).