



Roger Marion

27 y.o.
PhD in Earth Sciences -
Geodynamics
From Université Grenoble Alpes

25 chemin Joseph Brun, 38100 Grenoble
Tél. : +33 (0)6.89.02.96.94
Email : marion.roger@univ-grenoble-alpes.fr
marry.rogers23@gmail.com
Driving licence

CURRICULUM

- **2019-2023 : P.h.D in Geodynamics**, in Université Grenoble Alpes at ISTerre laboratory, on a ministerial grant – **defended the 06/29/2023**

P.h.D topic: **Quantification of sediment fluxes in the Carpathian foreland basin from the collision to slab detachment.**

Project supervision:

Peter van der Beek (University of Potsdam), thesis supervisor
Arjan de Leeuw (University of Grenoble Alpes), thesis co-supervisor
Laurent Husson (DR CNRS ISTerre), thesis co-supervisor

Thesis objectives :

- **Quantify and understand Carpathians exhumation**, notably by **inversion of a database of thermochronological ages** (ZFT, ZHe, AFT AHe) from the literature and from my field expedition to Ukraine in 2019.
- **Quantify sediment volumes** and their distribution in the Carpathian foreland basin, by stratigraphic age. The distribution of basin volumes is also correlated with the structural features of the East European Plate and its rheological differences.
- Understand the influence of **European slab lateral detachment dynamics** in the formation of the Carpathian chain and basin, including the effects of dynamic subsidence and depocenter displacement.

Collaborations:

- University of Potsdam, dating of samples using the (U/Th)/He method on apatite and zircons
- Geo3BCN, Barcelona Geology Laboratory, learning the TISC code (D. Garcia-Castellanos)
- GFZ, Potsdam, use of laboratory clusters for thermochronological database inversions.

- **2017-2019: Master's degree in Earth, Planetary and Environmental Sciences - Geodynamics specialization** - Université Grenoble Alpes
- **2014-2017: Bachelor's degree in applied Geology**, Université de Bourgogne Franche-Comté – University of Besançon

PROFESSIONAL AND REASEARCH EXPERIENCES

- **2020-2023 : Teaching of sedimentology and associated fieldwork. (~30h/year) :** Introduction to sedimentary rocks (detrital and carbonate) and sedimentary systems (detrital and carbonate) for Licence 3 students in Earth Sciences. Assistance to Licence 3 students on a 2-day field trip (Vercors, Alps).
Teaching unit directors: Matthias Bernet and Arjan de Leeuw
- **2019 : Teaching assistant, South Dakota School of Mines and Technology, (1 mois):** Geology and Alpine tectonics field camp in the French Alps. Sites of Dignes-les-bains and Argentière-la-Bessée.
 - Teaching of field geology to American students
 - Evaluation of field notes of student

- Helping during student's assignments

Director of field camp: Yann Gavillot, Dr. Nuri Uzunlar, Jérôme Nomade.

- **2019: Research internship at ISTerre laboratory, Grenoble (6 months):** Construction of a thermochronological database of the Carpathian belt and erosion quantification. Data inversion using the GLIDE program.
 - Compiling data and understanding the structure of the Carpathian chain
 - Data inversion using a GLIDE program
 - Skills: use of inverse modelling, data compilation, use of low-temperature thermochronology
 - Scientific fields: Tectonics, thermochronology, inverse modelling
- **2018 : Research internship at the ISTerre laboratory (3 months) :** Stratigraphy of the Mollasse Rouge d'Esparron-la-Bâtie (Southern Alps, France).
 - Mapping of the sedimentary sequence of the Mollasse Rouge outcrop at the Esparron-la-Bâtie site
 - Analysis of sedimentary facies and outcrop lateral variation
 - Facies association and construction of an evolution of the environments of deposition
 - Scientific fields: sedimentology and pedology
- **2017 : Research internship, Chrono-environnement Laboratory, Besançon (1 month):** Opening of the Southern Ocean, integration of extensive fault data from the Antarctic margin (Dumont d'Urville).
 - Scientific watch on the numerous fault data from the Southern Ocean margins
 - Integration of Antarctic margin data on the Dumont d'Urville site
- **2016 : Internship, BRGM de Franche-Comté (1 month):** "Contribution to the development of the BD-Cavité cavity database".
 - Updating the database with regional speleological archives

SCIENTIFIC COMMUNICATIONS

- 2017 : English TOEIC, 920/1000 (C1 level)
- Scientific Congress :
 - 2022: EGU in Vienna, pico presentation (7 min): "Construction of the Ukrainian Carpathian wedge from thermochronology and tectono-stratigraphic analysis".
 - 2021: EGU (online), pico presentation (7 min): "Diachronous exhumation of the Carpathian belt from thermochronology database inversions".
 - 2020 : Earth Sciences Meeting in Lyon (poster)
- Articles:
 - Roger et al., 2023 "Construction of the Ukrainian Carpathian wedge from low-temperature thermochronology and tectono-stratigraphic analysis", Solid Earth (Copernicus), <https://doi.org/10.5194/se-14-153-2023> .

- Research theme: Evolution of the Carpathian system associated with the west-to-east detachment of the Carpathian slab.

My thesis project involves a field that has been little studied: the link between the dynamics of the slab detachment, the formation of the foreland basin and the progressive quiescence of the Carpathian chain from west to east.

The lateral tearing of the European slab beneath the Carpathian system should have resulted in an increase in the slab-pull effect ahead of the tear, in the case of the Carpathians, towards the southeast. This increase should be correlated with a viscoelastic isostatic rebound of the plunging and overriding plates, resulting in basin overfilling and renewed erosion activity behind the tear. These effects would be visible along the arc, diachronically, from west to east.

The source-to-sink analysis included in my thesis project makes it possible, thanks to exhumation and sedimentation data in the Carpathian system from the Middle Miocene to the present day, to constrain a finite element model, linking tectonic, isostatic, surface erosion and climatic processes (TISC, D. Garcia-Castellano). In this way, the assumptions made about the dynamics of the detachment of the European slab beneath the Carpathian chain, and their consequences at the surface, can be confronted with the models proposed.

- Research theme: Sourcing for the North-West Black Sea platform

In the continuation of the Carpathian foreland basin, the drainage network delivers sediments into the Black Sea, particularly on the platform to the north-west of the basin. When reconstructing the Carpathian system, I estimated that the volume of sediment delivered to the north-western Black Sea shelf from the Middle Miocene to the end of the Pleistocene is 60,000 km³.

Based on interpreted cross-sections, most of the sediments that constitute the north-western Black Sea shelf are late Pontian (~4.7 Ma) to Quaternary in age. The vast majority of the Pliocene-Quaternary sediments that form the platform are sourced from the Danube, whose delta arrival on the platform is dated between 4.7-1.8 Ma. However, if the North-Western Platform is predominantly composed of Pliocene-Quaternary sediments sourced from the Danube delta, when and where are the sediments from the Carpathian foreland basin exported?

With the contributions of my thesis research, the sourcing of the North-Western Black Sea platform could be differentiated between sediments exported from the Carpathian foreland basin and those brought by the Danube, and establish the temporality in the export of sediments from the Carpathian system.