

Structural transmissivity and earthquake dynamics of the Geneva Basin

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Context

The Jura mountains are characterized by karstic aquifers insisting on a fold-and-thrust belt. Historical records show that major strike-slip faults in the region, such as the Vuache Fault, can generate middle-magnitude seismic events (i.e. the Ml 5.3 Epagny earthquake, (Thouvenot et al., 1998) that are capable of modifying shallow fluid flow regimes. Assuming that deep-seated interconnections between thrust and strike-slip systems may act as horizontal circulation pathways, this project aims at addressing whether is it possible to infer preferential flow directions reactivated by seismic events in the Great Geneva Basin. The MSc student will acquire structural and kinematic data on selected outcrops of the Geneva Basin to define fault properties. The goal of the study is to infer if some of the units forming the stratigraphic sequence of the Geneva Basin are more prone than others to be seismically perturbed.

Objectives and Methods :

This master aims at studying the structural transmissivity in the Geneva Basin.

The progression of the study will be the following:

- 1) Literature study
- 2) Structural Field work in the Geneva Basin
- 3) Data treatment, including stereographic projection, construction of fault evolution models, kinematic and dynamic analysis, map and cross-section construction
- 4) Definition of regional earthquake dynamics in the Geneva Basin

References

- Ishii, E. (2015). Predictions of the highest potential transmissivity of fractures in fault zones from rock rheology: Preliminary results. *Journal of Geophysical Research: Solid Earth*, 120(4), 2220-2241.
- Thouvenot, F., Fréchet, J., Tapponnier, P., Thomas, J. C., Le Brun, B., Ménard, G., ... & Paul, A. (1998). The ML 5.3 Epagny (French Alps) earthquake of 1996 July 15: a long-awaited event on the Vuache Fault. *Geophysical Journal International*, 135(3), 876-892.



Choice of orientation : RGEOL, SERG