UL UNIVERSITÉ
DE LORRAINE

POSTDOCTORAL
FELLOWSHIP

OPEN POSITION

Institut ÉLIE CARTAN   RING   geo Ressources

A NEW PROBABILISTIC MODEL FOR STOCHASTIC FAULT NETWORK MODELING

We are seeking a post-doctoral research fellow for the LUE-funded impact project DeepSurf at the University of Lorraine, Nancy, France. This two-year position concerns the development of a novel statistical model and inference framework for modeling geological faults from incomplete observations.

The target start date for the position is the first quarter of 2020.

CANDIDATE PROFILE

The applicants should hold a PhD in one of the following domains: mathematics, material science, physics or geosciences. Prior education and research must include a strong component in probabilistic modeling, statistics and computer programming.

The successful applicant should have a proven track record of peer-reviewed publications and excellent scientific writing and presentation skills in English.

Working knowledge of French language is welcome but not necessary.

HOW TO APPLY

Application files must include:

- A cover letter
- A detailed CV with complete list of publications
- The name of at least two referees who know the candidate well.
- A short presentation of the most important publications (half a page maximum).

Application files shall be sent by email exclusively to **_Tom.Caquineau@univ-lorraine.fr_** before Nov. 30, 2019. Suitable applicants will be interviewed by an Ad Hoc Commission by *December 20th, 2019*.

JOB DESCRIPTION

The objective of this work is to propose a general probabilistic model able to correctly describe geological faults and the associated uncertainty in the presence of incomplete spatial information.

For this, we plan to exploit recent advances in probabilistic models **combining random graphs and point processes**. Indeed, such models have been successfully used to automatically find galaxy filament patterns in astronomy data and for structural analysis in object-based image vision.

The first goal of this work is to propose a **probabilistic model** suitable for the analysis and simulation of fault networks. This Markovian-Gibbsian model will be based on random graphs and point processes. The parameters of this model will

control the topology of the fault network based on prior geological knowledge about how faults grow and interact. Based on this model, a **simulation method** will be defined using a Monte Carlo algorithm. The third goal is to develop a way to **infer model parameters** from existing fault observations, given some a priori knowledge about the shape and interactions of the faults.

CONDITIONS

This project is jointly sponsored by the Lorraine Université d'Excellence project DeepSurf, and the RING Consortium. It will be realized in collaboration between the RING team of the GeoRessources lab and the Institut Elie Cartan de Lorraine (IECL). The successful candidate will work with Prof. Radu Stoica (radu-stefan.stoica@univ-lorraine.fr) and Prof. Guillaume Caumon (Guillaume.Caumon@univ-lorraine.fr).

For the postdoctoral researcher, the main outcome is the mastering of modern techniques used today in statistical learning and data science. This double-sided project (mathematics and geoscience) will open opportunities to interact both with the academic community and with the private sector.

The position is a full time two-year work contract. Gross Salary: 2200€/Month, including social benefits and heath care. Travel expenses for conference participations are secured.

The position is located in Nancy, Lorraine. A one-bedroom apartment rental in Nancy is about 500 EUR monthly. Nancy is home of the UNESCO World heritage site Place Stanislas. It is only 90 minutes away from to Paris, Strasbourg and Luxembourg by high-speed train, and it enjoys a vibrant cultural life.