Savoie Mont Blanc University is recruting:

A POSTDOCTORAL RESEARCHER ON A 2-YEAR CONTRACT, FULL-TIME AS PART OF THE PROJECT:

DETECTION OF GRAVITATIONAL INSTABILITIES USING SYNTHETIC APERTURE RADAR INTERFEROMETRY (INSAR) AND DEEP LEARNING

SELECTION: JUNE 2026
START DATE: AUTUMN 2026

USMB job reference: LISTICDIGIRAP

Position:

Computer Science, Systems, Information and Knowledge Processing Laboratory (LISTIC)
Bourget-du-Lac or Annecy Campus, France

Partner laboratories:
- Institute of Earth Sciences (ISTerre)
- Environment and Dynamics of Mountain Territories *laboratory* (EDYTEM)
Bourget-du-Lac Campus, France

Project description and related research activities:

The aim of this project is to exploit the potential of satellite Synthetic Aperture Radar (SAR) imagery and AI methods to detect and monitor slow gravitational movements of seismic origin or linked to changes in the cryosphere in the Alps. The proposed approach is based on the complementarity between in-situ measurements taken at sites currently monitored by ISTerre and EDYTEM in the Aiguilles Rouges and Mont-Blanc massifs (Haute-Savoie) [Courtial-Manent-2023] [Ravanel-2024]*, and measurements obtained by SAR Interferometry (InSAR), which enable surface deformations to be spatialized and movements to be detected at a regional scale. The implementation of advanced InSAR processing chains will provide new insights into the phenomena observed and enrich the databases required for deep learning methods. The neural networks currently being developed at LISTIC to detect and segment areas of movement in interferograms will be tested and validated at known sites so that these methods can then be generalized to entire mountain massifs* [Bralet-2025].

Overview of the organization:

This position is offered as part of a multidisciplinary project which brings together three research units: the Laboratory of Computer Science, Systems, Information and Knowledge Processing *(LISTIC), project leader mainly located in Annecy, the* Environment and Dynamics of Mountain Territories *laboratory (EDYTEM), and the team from the* Institute of Earth Sciences *(ISTerre) located in Bourget-du-Lac.*

LISTIC is a research unit at the University of Savoie Mont Blanc (USMB) that brings together expertise in machine learning and information fusion, as well as networks and systems. It develops methods for processing and managing data in the fields of Artificial Intelligence (AI) and Earth Observation (EO). It has extensive experience in remote sensing, particularly in radar imaging and its application for measuring surface displacement. It has been collaborating for many years with geoscience laboratories, notably coordinating the ANR project "Extraction and Fusion of Information for the Measurement of Displacements by Radar Imaging (EFIDIR)" and participating in the supervision of PhD theses with the ISTerre and EDYTEM laboratories.

ISTerre is a joint research unit (UGA/CNRS/USMB/IRD/UGE) with a branch located in Bourget-du-Lac. Continuous observations, carried out over long periods, are at the heart of the research conducted at ISTerre. They are essential for understanding, modeling, and anticipating the natural processes visible on the Earth's surface. By providing a better understanding of the formation, evolution, and variability of the Earth system, these observations constitute a fundamental and structuring activity of the research developed within the laboratory. Through a combination of in situ and spatial observations, ISTerre strives to detect early warning signs and better anticipate major natural phenomena. This research also contributes to the development of monitoring, early warning, and decision-making tools for risk management, as well as to training, awareness-raising, and preparedness initiatives for societies facing these hazards.

EDYTEM is also a joint research unit (CNRS/USMB). It works on issues related to mountain environments using an integrated and multidisciplinary approach. The Morphodynamics team focuses on understanding the evolution of landforms at different time scales (long- and short-term formation and evolution of mountain ranges), the response of mountain environments to past and present climate change, and the impacts on societies (hazards, practices, management). The team relies in particular on the platforms 5D Imaging *(I5D; cartography, topography, imaging, 5D) and* Sampling, Instrumentation and Fieldwork *(PINTE).*

Job responsibilities and duties:

The role of the person recruited will be twofold: to be involved in producing InSAR results on movements monitored at the local level and to implement deep learning methods to detect this type of movement on a larger scale. In the first year, he/she will have to explore the existing work, data, and in-situ measurements at the sites instrumented by ISTerre and EDYTEM in the Aiguilles Rouges and Mont Blanc massifs. He/she will compile the archive of Sentinel-1 SAR images used to observe these sites and generate interferograms using a multi-temporal InSAR processing chain such as the SBAS approach [Minh-2022]. Analysis of the results and comparison with in-situ data will enable the processing and the "expert" approach to be refined for the "manual" search for gravitational movements in the interferogram series.

The second year will focus on AI methods to reproduce this approach using a machine trained to detect and segment fringes related to the movements being sought. This second phase will be able to leverage existing databases such as ISSLIDE [Bralet-2024] and enrich them with patterns observed at the sites studied. Depending on the AI skills of the person recruited, he/she will run existing models, particularly those developed at LISTIC [Bralet-2025], and retrain them on this type of data using a domain adaptation strategy, or he/she will tackle the construction of new models that better exploit the temporal dimension of interferogram series and prior knowledge of the phenomena being sought. The work may continue by applying the trained AI models to entire mountain ranges.

Practice requirements:

The successful candidate will work in collaboration with researchers from the three partner units involved in the project. She/he will be assigned to the LISTIC laboratory, preferably at the Bourget-du-Lac site, but may possibly be assigned to the LISTIC laboratory at the Annecy site, depending on her/his profile. Regular exchanges, particularly via video conferencing, are planned between the two sites. Depending on the progress of the project, it may be possible to work remotely one or two days per week.

Job-specific requirements:

Good physical conditions may allow for field visits to be carried out.

Required skills:

The successful candidate will have solid experience in one of the disciplines (typically through a PhD thesis), with significant skills in the second (typically through their initial training, an internship, or a prior post-doc). We are therefore seeking applications from the remote sensing and geosciences community (cryosphere, geophysics) with good knowledge of image processing and off-the-shelf AI tools, or from the signal/image/AI community with experience in applications related to Earth observation, signal physics, or physical model inversion.

Employment requirements:

Applications are open to individuals who hold a doctorate awarded by a French university, or a degree recognized as equivalent by the university, including a doctorate or PhD awarded by a foreign university.

Documents required for the application:

- cover letter,
- detailed resume,
- copy(ies) of your degree(s),
- thesis defense report.

Contract duration:

- Full-time fixed-term Level A contract from September 2026, to August 2028.
- The first 3 months of the contract will be considered a probationary period.

Remuneration:

Gross monthly salary based on the pay scale for standard-grade senior lecturers as at 1 January 2024: for the proposed full-time position, from €2,638.61 (based on step 2) to €3,189.96 (based on step 4) – a proposed salary range to take account of professional experience.

Information regarding the role and responsibilities of the position:

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References:

[André-2021] André P., Doin M-P., Mathey M., Zerathe S., Vassallo R., Baize S. (2021). Four years of InSAR time series analysis reveals an unprecendent inventory of active DSGSD in the Western Alps. EGU General Assembly, Vienna, Austria, 2021

[Bralet-2024] Bralet A., Trouvé E., Chanussot J., Atto A., ISSLIDE: A new InSAR dataset for Slow SLIding area DEtection with machine learning, IEEE Geoscience and Remote Sensing Letters, vol. 21, pp. 1-5, 2024, https://doi.org/10.1109/LGRS.2024.3365299

[Bralet-2025] Bralet A., Atto A., Chanussot J., Trouvé E., ECSPLAIN: Explainability-Constrained Classifier for Pairing the Detection and the Localization of Moving Areas From SAR Interferograms, in IEEE Transactions on Geoscience and Remote Sensing, vol. 63, pp. 1-18, 2025, https://doi.org/10.1109/TGRS.2025.3595267

[Courtial-Manent-2023] Courtial-Manent L., Mugnier J-L., Zerathe S., Carcaillet J., Vassallo R., Ravanel L., Tavernier L., Buoncristiani J-F. (2023). Late Holocene initiation of a deep rock slope failure in an alpine valley revealed by 10Be surface exposure dating (Chamonix, France). Quaternary International, 652, pp.52-62. https://doi.org/10.1016/j.quaint.2022.10.001

[Minh-2022] Ho Tong Minh D., Hanssen R., Doin M.-P. and Pathier E. (2022). Advanced Methods for Time-series InSAR. In Surface Displacement Measurement from Remote Sensing Images (eds O. Cavalié and E. Trouvé). https://doi.org/10.1002/9781119986843.ch5

[Ravanel-2024] Ravanel L., Mugnier J.-L., Duvillard P.-A., Lhosmot A., Rabatel A., Deline P. (2024). 18-years of high-Alpine rock wall monitoring using Terrestrial Laser Scanning at the Tour Ronde east face, Mont-Blanc massif. *Environmental Research Letters*, 19, 034037. https://doi.org/10.1088/1748-9326/ad281d