

ESR 4.1 - Intensity measure and engineering demand parameter for natural and induced seismicity A Research PhD position in the URBASIS ITN funded by the EC

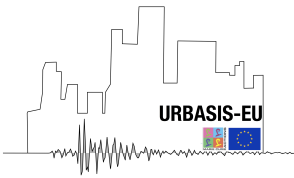
Supervisor - Philippe Guéguen (UGA Grenoble) - Danijel Schorlemmer (GFZ Potsdam)

Recent devastating earthquakes and induced seismicity near infrastructures must become the centrepiece of analysis in reducing risk and increasing resilience, facing up to global urban population growth in the coming decades and the concentration of wealth in cities. The prediction of seismic ground motion and response of structures are key issues in reduction of seismic urban risk. There is therefore a demand for highly trained scientists with a broad understanding of engineering seismology and earthquake engineering, skills being essential in academic research, in private companies with activities related to risk mitigation and energy facilities and for policy makers. The URBASIS-EU project aims to provide a multi-disciplinary training platform for young scientists in order to develop their individual project and to promote their entrepreneurship and their employability toward the academic, private and insurance or decision-making sector. High-quality supervision of the young scientists will be ensured through the international recognition of the URBASIS-EU partners. A comprehensive set of transferable skills will be developed through innovative and interdisciplinary joint research projects between academic and non-academic partners on the prediction of seismic hazard in urban areas considering low-probability/high-consequences events and induced seismicity related to the exploitation of energy resources; the seismic ground motion prediction within the non-free-field urban area; the coupling between ground motion and structures/infrastructures responses for natural and induced seismicity including time-dependent vulnerability; and the systemic risk of interconnected urban systems. URBASIS-EU will create a lasting collaboration for the establishment of a European network of academic and non-academic experts, improving the interface with decision-makers.

More information: <https://urbasis-eu.osug.fr/?lang=en>

Job description

By relating a probability of damage to a ground-motion intensity measure (IM), such as peak values or response spectra, vulnerability curves of structures account for variability due to the building model definition, the threshold damage parameter (EDP) and the IMs. The relation between EDP and IM can be linked to damage prediction when associated with damage-state thresholds. We defined two natures of IM: (1) an efficient IM defined as providing small variability of the conditional probability of damage (DM) given as $P(DM|IM)$; and (2) a sufficient IM defined as providing conditionally independent DM of the magnitude and distance. Coupled with real-time estimates of seismic ground motion, we propose a real-time assessment of expected damage for critical facilities according to the nature of the seismicity (i.e., natural, induced). Most of these studies use numerical methods to model building responses, and a “building-specific” prediction for a given scenario can provide accurate estimation of damage. In an urban environment, the amount of open data has increased in northern Europe. The exposure of the build environment will be derived from innovative techniques that relying on crowd-sourced geographic data (e.g., from OpenBuildingMap) and expert-driven mapping of exposure proxies to vulnerabilities of buildings. The ESR will aim to assess the correlation between efficient Intensity measures IMs and building responses using experimental and



numerical data; to assess the variability of the building response through the normalised relative roof displacement, with a combination of IMs proposed as predictive equations of the expected responses of buildings; to use open-urban data for highly detailed exposure models derived for selected urban areas, coupled with ground-motion prediction (GMPE or/and GMICE).

The URBASIS consortium is funded by European Commission's Innovative Training Network (ITN) program. This research project will take place at the University Grenoble Alpes, France, within the Institute of Earth Science (ISTerre). This project will involve close collaboration with GFZ Potsdam, where the researcher will spend several months. The project will also involve secondment with AON Benfield.

Requirements and Application

The successful applicant must have a Master degree in seismology, earthquake engineering and engineering seismology or similar. The applicant is expected to have a very strong statistics and signal processing background. Furthermore, knowledge of open data and machine learning is an advantage. Excellent undergraduate and master degree grades are expected. A high level of written and spoken English is also expected

PhD stipends are allocated to individuals who hold a Master's degree. PhD stipends are normally for a period of 3 years. It is a prerequisite for allocation of the stipend that the candidate will be enrolled as a PhD student at the Doctoral School of University Grenoble Alpes in accordance with the regulations of Terre-Univers-Environment on the PhD Program at the University. According to the URBASIS-EU, the progress of the PhD student shall be assessed every 12 months. It is a prerequisite for continuation of salary payment that the previous progress is approved at the time of the evaluation.

The qualifications of the applicant will be assessed by the **Selection committee**. On the basis of the recommendation of the **Selection** committee, the Dean of the Doctoral School of University Grenoble Alpes will make the final decision for allocating the stipend.

URBASIS-EU wishes to reflect the diversity of society and welcomes applications from all qualified candidates regardless of personal background or belief. We encourage applications from everyone irrespective of gender and ethnic group but, as women and members of ethnic minority groups are currently under-represented at this level of post, we would encourage applications from members of these groups. Appointment will be based on merit alone.

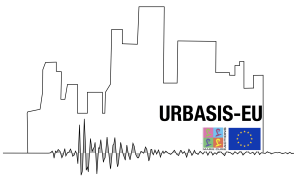
Application must be in a form of a single PDF file including a CV, a cover letter, academic transcripts, and the names and complete contact information and letter of two referees sent through :

- the consortium web-page <https://urbasis-eu.osug.fr/?lang=en>
- the EU EURAXESS portal <https://euraxess.ec.europa.eu/>

Vacancy number : URBASIS-EU ESR4.1 (to be reminded in the application form)

Deadline : February, 23rd 2019

Salary : According to the European Commission and local standards ; minimum gross wage is 3500 euros before local taxes



Contact Information

You may obtain further information from :

- **Philippe Guéguen**, URBASIS project coordinator : philippe.gueguen@univ-grenoble-alpes.fr (ISTerre, Earth Science Institute, Université Grenoble Alpes) for general questions regarding the URBASIS consortium, concerning the scientific and training aspects of the ITN program and concerning the scientific aspects of this PhD project.
- **Florence Cataye**, URBASIS project manager : florence.cataye@univ-grenoble-alpes.fr for administrative questions.

For more information of Doctoral School: <https://doctorat.univ-grenoble-alpes.fr/en/> and <https://ed-tue.osug.fr/?lang=en>