ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich

SED Schweizerischer Erdbebendienst Swiss Seismological Service

Entrepreneurial Risks

PhD opportunities at ETH Zürich

Swiss Seismological Service & Chair of Entrepreneurial Risks

The Statistical Seismology Group of the Swiss Seismological Service and the Chair of Entrepreneurial Risks invite candidates to apply for **two available PhD positions** to work on earthquake forecasting based on high-resolution fault network imagery, multi-scale strain-field analysis and stress-based probabilistic seismicity modeling. The two PhDs define the core of an ambitious interdisciplinary project between the Swiss Seismological Service (Prof. Domenico Giardini, Dr. J. Wössner) and the Chair of Entrepreneurial Risks (Prof. Didier Sornette, Dr. G. Ouillon).

The goal of this project is (i) to develop a new set of physics-based methods for forecasting earthquakes, based on past seismicity, and (ii) to understand the role of small events in the nucleation process of the largest ones. The proposed seismicity-based forecasts are founded on the fundamental recognition that seismicity and faulting are intimately interwoven: earthquakes occur on faults and faults grow through accumulation of earthquakes. An intrinsic limitation of present efforts to forecast earthquakes lies in the fact that only a limited part of the full fault network has been revealed, notwithstanding the best efforts combining geological and geophysical methods together with past seismicity. Neglecting the information from fault networks constitutes a major gap in the understanding of the spatio-temporal organization of earthquakes, thus limiting drastically the quality and efficiency of existing forecasting methods. We propose to address this gap by enhancing and developing novel methods using the fundamental earthquake-fault relationship to obtain physics-based forecasts or earthquake rates, strain and stress fields, using sophisticated statistical pattern recognition methods that better constrain the geometry of seismogenic zones. Taking account of all past events regardless of their size will also bring new insights about the role of small events in the triggering process of the major ones, a still unresolved and fundamental issue in the physics of the collective behavior of earthquakes.

Profile of applicants: We are especially interested in candidates with a M.Sc. or Diploma in geophysics, physics, statistics and numerical modeling. Strong analytical, programming and visualization skills, fluency in English and readiness to work in a multidisciplinary team are essential. Applicants should submit a letter of application including a short statement of research interests, names and addresses of two references and a curriculum vitae. Please address all correspondence to Dr. Guy Ouillon (Ouillon@aol.com) and Dr. J. Wössner (j.woessner@sed.ethz.ch). The PhD students will be located at the Swiss Seismological Service, to ensure optimal teamwork and collaboration with the different involved parties. The position is available from SEPTEMBER 2011 or soon after and is funded for three years, which is the anticipated time to obtain a Doctoral Degree at ETH Zurich.

Salary compensation and ETH Zurich: Each PhD student will benefit from a very attractive salary by international standard and its associated social security coverage. ETH Zurich is one of the leading international universities for technology and the natural sciences, striving to provide excellent education, groundbreaking basic research and applied results that are beneficial for society as a whole. ETH Zurich has more than 16,000 students from approximately 80 countries, 3,500 of whom are doctoral candidates. ETH Zurich regularly appears at the top of international rankings as one of the best universities in the world, and according to various professional surveys, Zurich was named the city with the best quality of life in the world as well as the wealthiest city in Europe.