Micro- and moderate seismicity in Stable Continental Regions
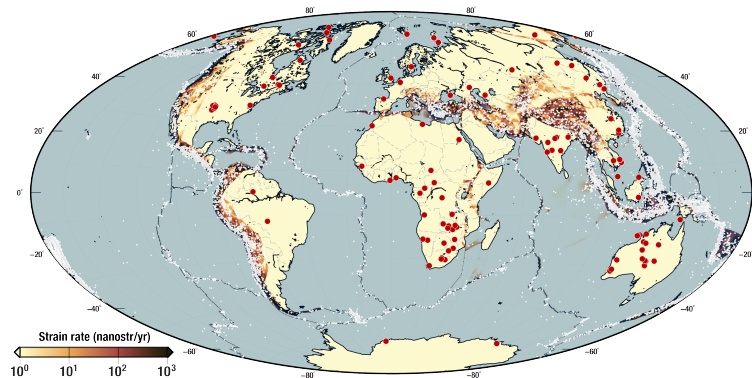

A map of all earthquakes of M>6 from 1900 to 2015 superimposed on the global strain map from Kreemer et al. Red dots are intraplate earthquakes while white dots are plate boundary events from the ISC.

Job description:

In the frame of the iQuake project, funded by the ERC (2024-2029), we seek to hire a PhD student for a duration of three year. The project involves building new catalogs of low-magnitude seismicity (microseismicity) in stable continental regions using recent machine-learning-based earthquake detection techniques. The catalogs will be used to constrain new models of the rheology of marginally deformed continental regions. The PhD student will join the team of Pr. Romain Jolivet at Ecole normale supérieure - PSL in Paris, France and work within the *Laboratoire de Géologie de l'ENS* hosted by the *Département de Géosciences*.
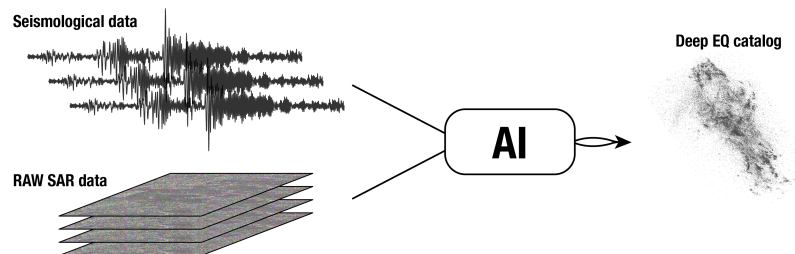
PhD project summary: turning seismic and geodetic data into deep catalogs of earthquakes in Stable Continental Regions

General project description:

While most earthquakes occur along rapidly deforming plate boundaries, continental interiors are less often struck by devastating earthquakes. Over the last centuries, multiple events have left scientists puzzled as to how could such earthquake occur as they do not follow the classic and now quite well accepted description of earthquakes as the response of a frictional interface to stress which more or less constantly increases with time. In continental interiors, no relative motion is observed across the faults responsible for those earthquakes, which by themselves indicate that elastic strain energy is available in the upper crust. In the iQuake project, we seek to explore the distribution of seismicity within such Stable Continental Regions using Machine Learning technologies on seismic and geodetic data (WP1) and uncover the various stress perturbations acting on the continents at all temporal and spatial scales (WP2) to test an elasto-plastic rheology implementing static fatigue (WP3). The project will start in Septembre 2024.

Advising team:

The PhD candidate will be advised by
- Pr. Romain Jolivet (romain.jolivet@ens.fr, https://www.geologie.ens.fr/~jolivet)
- Dr. Eric Beaucé (ebeauce@ldeo.columbia.edu, https://ebeauce.github.io/)

Department description:
The Département de Géosciences of ENS trains researchers and engineers of the highest level in solid Earth, Ocean and Atmospheric Sciences (Bachelor, Master, Doctorate) who desire to contribute to scientific advancement in all disciplines of Earth sciences. The Département de Géosciences of ENS hosts the Laboratoire de Géologie de l'ENS (LGENS). Established in 1880, LGENS is a joint laboratory between ENS-PSL and the Centre National de la Recherche Scientifique (CNRS). Building upon a long-standing history in Solid Earth and Environmental sciences, LGENS drives research across a wide range of domains, from the outermost to the innermost envelopes of our planet, fostering exchanges between domains of Earth sciences.

ENS-PSL has been awarded the « HR Excellence in Research » (HRS4R) award, hence our institution is engaged in an open and transparent hiring process, based on the academic merit of all candidates. ENS-PSL is deeply engaged in professional equality and the fight against all discriminations. Our Department, like all ENS-PSL institutions supports equality, diversity and inclusion in its community. We hence encourage candidates from all backgrounds with diverse profiles to apply.

Contract duration: 36 months (PhDs last three year in France).

Salary: 1400 to 1600 € / month (benefits included).

Contacts:
Romain Jolivet (**romain.jolivet@ens.fr**)
Éric Beaucé (**ebeauce@ldeo.columbia.edu**)

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