PhD Program between the Freie Universität Berlin (FUB) and the China Scholarship Council (CSC)
Open PhD position for CSC scholarship candidates 2015

The PhD position is only offered to Chinese PhD candidates for application in the framework of the FU-CSC Program.

Department/Institute:	Earth Sciences / Geological Sciences
Subject area:	Geophysics
Name of Supervisor:	Prof. Dr. Frederik Tilmann
Number of open positions:	1
Project title:	High resolution passive seismic imaging of the Chilean subduction zone

Project description:

Giant and great earthquakes with magnitudes larger than 8 occur predominantly along the megathrusts of subduction zones. It has become increasingly clear that the frictional properties vary both along-strike and along-dip of the fault zone, with some parts only breaking in great earthquakes and some breaking preferably in moderate size earthquakes. Other parts of the fault are creeping or show intermediate behaviour in the form of seismic tremor and transient slip events. Similarly, faults in the overriding plate have a strong influence on the evolution of the system and present an often-underestimated hazard. However, we lack even a basic understanding of the structural or compositional controls for these different behaviours. One of the reasons is that classical passive imaging techniques like seismic tomography generally have a resolution of no better than 10 km or so, whereas the active plate interface as illuminated by aftershocks or interseismic seismicity is less than 1-2 km wide. Local earthquakes in the subduction zone provide a convenient source of high-frequency seismic waves.

The FU Berlin and the GFZ-Potsdam together with their international partners have acquired a rich dataset based on temporary and permanent installations along the Chilean margin, including a plate boundary observatory in Northern Chile. On April 1, 2014 a magnitude 8.1 earthquake occurred in this region near the town of Iquique, and both its precursory phase and aftermath was recorded by multiple broadband, GPS and accelerometer stations. Our initial analysis pointed (Schurr et al., Nature 2014) pointed out the importance of the foreshock sequence in preparing the margin for the rupture, but also highlights the remaining potential for a future large earthquake.

The aim of this project is to develop and apply the methodologies to use the signals from local earthquakes for high-resolution imaging of fault zones, focusing on the analysis of data from small-scale seismic arrays and dense local deployments (in addition also from dense temporary deployments in the area of the 2010 Mw 8.8 Maule earthquake). The project suits a candidate who would like to develop his/her skills in forward modelling and inversion of seismic waveforms, and is interested in applying these methods to the problem of fault zone properties. Access to a modern computer cluster will be provided. The candidate will need to present his or her results at international meetings. He or she will engage in interdisciplinary exchanges with a team of scientists working in the same region with different methods and approaches. Furthermore, the candidate can be trained and participate in seismological fieldwork.

Language requirements:

Good written and spoken English required

Academic requirements:

Master/MSc in Geophysics or Physics.
Good knowledge of elastic wave propagation, inverse theory and/or seismological processing. Good knowledge of programming language (e.g. matlab, python, C/C++, Fortran). Proficiency in Linux/Unix advantageous.

Link to professor and further information:

Personal webpage
http://www.geo.fu-berlin.de/geol/fachrichtungen/geophy/Fachrichtung/Mitarbeiter/S_PROFESSUREN/TILMAN_FREDERIK/index.html
Information on recent large earthquake / experimental data:
http://www.ipoc-network.org/index.php/ipoc/the-2014-pisagua-earthquake-special-page.html
http://geofon.gfz-potsdam.de/eqinfo/special/gfz2014gkgf/
Please note:
In a first step the complete application should submit to the Beijing Office for evaluation by January 4th. Please don't contact the professor before. She will get in contact with you after having received the complete application in January.