



Freie Universität



In October 2015, the DFG Research Training Group "Natural Hazards and Risks in a Changing World" (NatRiskChange) will be established at the University of Potsdam and will be run in cooperation with the Freie Universität of Berlin, the German Research Centre for Geosciences GFZ and the Potsdam Institute for Climate Impact Research (PIK).

NatRiskChange aims to develop methods that improve hazard and risk analyses and quantifications based on the transient, non-stationary nature of hazards and risks in response to changing natural and anthropogenically altered components of the earth system. Key scientific aims are the development, testing and pilot application of studies on the identification, quantification and prediction of transient natural hazards and associated risks. Earthquakes, floods, and mass movements are of major research interest.

Together with its partners, the University of Potsdam jointly offers the following positions subject to the allocation of funds by the DFG in the DFG Research Training Group "Natural Hazards and Risks in a Changing World" (NatRiskChange):

12 Academic Staff Members

(12 PhD positions, 0.75 part-time at the salary scale E 13 TV-L or TV-L FU)

and

1 Academic Staff Member (Postdoc position, full-time at the salary scale E 13 TV-L)

Applicants are asked to refer to one of the following topics:

- **155-I1/2015:** Natural hazards in a changing climate What causes the variability? (Supervisors: Dr. Henning Rust, Prof. Dr. Uwe Ulbrich, FU Berlin)
- **155-I2/2015:** Study of transient periods in natural and in induced seismicity (Supervisors: Dr. Sebastian Hainzl, GFZ Potsdam; Prof. Dr. Matthias Holschneider, PD Dr. Gert Zöller, University of Potsdam)
- **155-I3/2015:** Towards non-ergodic, time dependent, ground-motion models (Supervisors: Prof. Dr. Fabrice Cotton, GFZ Potsdam; Prof. Dr. Frank Scherbaum, University of Potsdam)
- **155-I4/2015:** Changing Risk from Glacial Lake Outburst Floods (Supervisors: Prof. Dr. Ariane Walz, Prof. Dr. Oliver Korup, University of Potsdam; Dr. Sigrid Rössner, GFZ Potsdam)
- **155-Q1/2015:** Regional flood hazard changes from a space-time recurrence perspective (Supervisors: Prof. Dr. Bruno Merz, GFZ Potsdam; Dr. Norbert Marwan, PIK Potsdam)
- **155-Q2/2015:** Complex network analysis based on event synchronization of natural hazards (Supervisors: Prof. Dr. Jürgen Kurths, PIK Potsdam; Prof. Dr. Bruno Merz, GFZ Potsdam)
- **155-Q3/2015:** Understanding drivers of changing susceptibility of flood-prone residents (Supervisors: Prof. Dr. Annegret Thieken, PD Dr. Gert Zöller, University of Potsdam)
- **155-Q4/2015:** Analyzing changes in micro-scale flood related vulnerability of companies (Supervisors: Dr. Heidi Kreibich, GFZ Potsdam; Prof. Dr. Frank Scherbaum, University of Potsdam)
- **155-P1/2015:** Landslide Prediction under Changing Boundary Conditions (Supervisors: Prof. Dr. Oliver Korup, University of Potsdam; Prof. Dr. Jürgen Kurths, PIK Potsdam)
- **155-P2/2015:** Transient merging of two Rhine flow regimes from climate change (Supervisors: Dr. Gerd Bürger, Prof. Dr. Axel Bronstert, University of Potsdam)
- **155-P3/2015:** Spatio-temporal response of extreme precipitation to climate change and decadal climate variability (Supervisors: Prof. Dr. Matthias Holschneider, University of Potsdam; Dr. Henning Rust, Prof. Dr. Uwe Ulbrich, FU Berlin)
- **155-P4/2015:** Assessment of early-warning signals and tipping points of sudden ecosystem shifts causing rapid land degradation in drylands (Supervisors: Dr. Eva Müller, Prof. Dr. Axel Bronstert, University of Potsdam; Dr. Saskia Förster, GFZ Potsdam)
- **155-PDA/2015:** Stationarity versus non-stationarity and the effect on respective probabilities (Postdoc position at University of Potsdam, Institute of Earth and Environmental Sciences; Prof. Dr. Axel Bronstert)

Responsibilities and requirements depend on the PhD project and are outlined on the website www.natriskchange.de. The PhD posts are part-time (75 %), fixed-term employment contracts for 3 years. The postdoc position is a full-time fixed-term employment contract for 3 years. Contracts are time-limited according to the Academic Fixed-Term Contract Law (WissZeitVG). The salary scale is TV-L E13. Employment in all positions shall begin at October 1st, 2015.

Handicapped applicants will be given preference in case of equal suitability. The NatRiskChange consortium strives to increase the proportion of women in research and specifically encourages females to apply for these positions. People with an immigration background are specifically encouraged to apply.

Applications should include the following components: CV, letter of motivation, research interests (specific interests and research plan for PhD project), a record of studies, master and bachelor certificates including a transcript of records, two letters of recommendation as well as an English language certificate. The files should be sent in PDF format by e-mail to **Dr. Theresia Petrow (thpetrow@uni-potsdam.de)** by **June 29th**, **2015**.









Description of the single posts:

PhD-Project 155-I1/2015: Natural hazards in a changing climate – What causes the variability?

(Supervisors: Dr. Henning Rust, Prof. Dr. Uwe Ulbrich, FU Berlin)

Responsibilities:

The PhD-project "Natural hazards in a changing climate – What causes the variability?" is based at the research team "Climate diagnostics and extreme meteorological events" of Freie Universität Berlin. The PhD-project shall develop methodologies for the identification and quantification of decadal anomaly periods with respect to the occurrence and intensities of winter wind storms in Central and Southern Europe, discerning them from the anthropogenic climate change. In particular, non-stationary response patterns from ocean temperature anomalies are considered, using decadal climate prediction runs.

Requirements:

We are seeking applications from highly motivated individuals with a diploma/master degree in meteorology, climate dynamics or a closely related subject. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with statistical climate diagnostics approaches, the evaluation of climate models, and an understanding of relevant physical mechanisms in the project context are desired skills.

PhD-project 155-I2/2015: Study of transient periods in natural and in induced seismicity

(Supervisors: Dr. Sebastian Hainzl, GFZ Potsdam; Prof. Dr. Matthias Holschneider, PD Dr. Gert Zöller, University of Potsdam)

Responsibilities:

The PhD-project "Study of transient periods in natural and induced seismicity" is based at the research teams "Applied Mathematics" of the University of Potsdam and "Physics of Earthquakes and Volcanoes" of the GFZ German Research Centre for Geosciences. The project aims at designing appropriate statistical methods for the identification of transient periods in seismicity in space and time, which include natural and anthropogenic (e.g. earthquakes triggered by fluid intrusion) deviations from stationarity. For this aim, methods of statistical and physical modelling of seismicity will be used along with modern techniques of Bayesian inference, uncertainty assessment and model selection.

Requirements:

We invite highly motivated individuals from applied mathematics, seismology or physics to apply for the position. Candidates from seismology or physics should have a solid background in mathematics, especially in statistics and probability theory. For mathematicians it would be a plus to have experience with statistical modelling of seismicity or other natural systems. The PhD project will be carried out in an interdisciplinary research team. Fluency in the English language (speaking and writing) is mandatory.

PhD-project 155-I3/2015:Towards non-ergodic, time dependent, ground-motion models (Supervisors: Prof. Dr. Fabrice Cotton, GFZ Potsdam; Prof. Dr. Frank Scherbaum, University of Potsdam)

Responsibilities:

The PhD-project "Towards non-ergodic, time dependent, ground-motion models" is based at the research teams "General Geophysics" of the University of Potsdam and "Seismic Hazard and Stress Field" of the GFZ German Research Centre for Geosciences. The project aims at developing data-driven and physics-based ground motion models which take into account regional variations and potential time dependencies of ground motions. The methods to be applied include classical and Bayesian data and uncertainty analyses. We will analyze high-quality strong-motions databases and discuss the fault properties variations (e.g. stress-drops) that may explain the observed ground-motion time dependencies.

Requirements:

We invite highly motivated individuals from geophysics to apply for the position. We expect a solid background in seismology, statistics, signal processing, programming skills, and interest in the quantitative assessment of hazards. The PhD project will be carried out in an interdisciplinary research team. Fluency in the English language (speaking and writing) is mandatory.









PhD-project 155-I4/2015: Changing Risk from Glacial Lake Outburst Floods

(Supervisors: Prof. Dr. Ariane Walz, Prof. Dr. Oliver Korup, University of Potsdam; Dr. Sigrid Rössner, GFZ Potsdam)

Responsibilities:

The PhD-project "Changing Risk from Glacial Lake Outburst Floods" is based at the research team "Landscape Management" of the University of Potsdam. The PhD-project aims at quantifying the contemporary and future risk from glacial lake outburst floods for selected sites in the Himalayas. Such risk appraisals are rare, though highly desirable in times of rapidly melting mountain glaciers and commensurately expanding meltwater lakes. Methods for this project will involve analyses of repeat satellite imagery, modelling of lake outburst and flood propagation, simulation of land-use and population scenarios, and assessment of these transient variables and their uncertainties using Bayesian networks.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in quantitative geosciences, remote sensing, geovisualisation or Geographic Information Systems (GIS). Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with statistical software and learning, processing of large and inhomogeneous geodata or remote sensing data is desirable. We expect a solid background in mathematics, programming skills and interest in the quantitative assessment of geohazards and risks. A basic knowledge of geomorphology, glaciology, and modern risk concepts will be of advantage for this post.

PhD-project 155-Q1/2015: Regional flood hazard changes from a space-time recurrence perspective

(Supervisors: Prof. Dr. Bruno Merz, GFZ Potsdam; Dr. Norbert Marwan, PIK Potsdam)

Responsibilities:

The PhD-project "Regional flood hazard changes from a space-time recurrence perspective" is based at the research team "Hydrology" of GFZ. The PhD-project aims at better understanding and quantifying temporal changes in flood characteristics. Recurrence analysis, a novel and powerful method to investigate dynamics, transitions, and even indirect couplings, will be applied to address the dynamics of flood events at two time scales: At the flood event time scale to understand the interactions of variables that lead to floods, and at the interannual to decadal time scale to understand the dominant controls on the long-term temporal changes in flood hazard.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in statistical modelling and data analysis and very good knowledge in programming. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Knowledge on flood hazard processes, from meteorological through hydrological to hydraulic processes, is desirable.

PhD-project 155-Q2/2015: Complex network analysis based on event synchronization of natural hazards

(Supervisors: Prof. Dr. Jürgen Kurths, PIK Potsdam; Prof. Dr. Bruno Merz, GFZ Potsdam)

Responsibilities:

The PhD-project "Complex network analysis based on event synchronization of natural hazards" is based at the research domain "Transdisciplinary Concepts and Methods" of PIK. The PhD-project aims at understanding space-time dynamics of extreme natural events by using complex networks. This novel method analyses the concurrent or lagged occurrence of extreme events at different locations. It will be adapted for spatiotemporal climatological and flood data with the ultimate goal of better understanding how extreme floods in Central Europe and in the Mekong River Basin are linked to climate.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in statistical modelling and data analysis and very good knowledge in programming. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Knowledge on hydro-meteorological processes is desirable. For extending the methodological development to other types of natural hazards, knowledge on georisks is of benefit.

PhD-project 155-Q3/2015: Understanding drivers of changing susceptibility of flood-prone residents

(Supervisors: Prof. Dr. Annegret Thieken, PD Dr. Gert Zöller, University of Potsdam)









Responsibilities:

The PhD-project "Understanding drivers of changing susceptibility of flood-prone residents" is based at the research teams "Geography and Natural Risks Research" and "Applied Mathematics" of the University of Potsdam. The PhD-project aims at explaining and quantifying changes in the susceptibility of residents and their homes to flooding due to their precautionary and preparatory behaviour. The ultimate goal is to develop more reliable flood loss estimation models that account for private mitigation measures and can hence be used to assess future flood risks and risk reduction through non-structural adaptation.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in applied mathematics, data analysis and statistical modelling. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with data mining, programming, Bayesian networks and GIS is desirable. Knowledge on hydro-meteorological hazards and their impacts as well as on risk management strategies would be a plus.

PhD-project 155-Q4/2015: Analysing changes in micro-scale flood related vulnerability of companies

(Supervisors: Dr. Heidi Kreibich, GFZ; Prof. Dr. Frank Scherbaum, University of Potsdam)

Responsibilities:

The PhD-project "Analysing changes in micro-scale flood related vulnerability of companies" is based at the section 5.4 Hydrology of the German Research Centre for Geosciences GFZ. The PhD-project aims at analysing past changes in exposure and susceptibility of small to medium companies to flooding (detection of change) and at identifying the main drivers of change (attribution). Data mining techniques such as decision trees and Bayesian networks will be used to identify typical vulnerability patterns at the microscale (i.e. at company level) and quantify their non-stationarity.

Requirements:

We are seeking applications from highly motivated individuals with excellent Master's degree in geo-informatics, mathematics, engineering or geosciences with a strong background in multivariate statistics including data mining. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with Bayesian networks, GIS and modelling is an asset. We expect a strong interest in flood risk and vulnerability research.

PhD-project 155-P1/2015: Landslide Prediction under Changing Boundary Conditions

(Supervisors: Prof. Dr. Oliver Korup, University of Potsdam; Prof. Dr. Jürgen Kurths, PIK Potsdam)

Responsibilities:

The PhD-project "Landslide Prediction under Changing Boundary Conditions" is based at the research team "Geohazards" of the University of Potsdam. The PhD-project aims at quantifying the predictability of landslides under changing climatic and land-use conditions. Time-series analysis of landslides is a rather novel approach that aims to unravel the frequency and magnitude, and thus hazard, of landslides as a function of rainfall, earthquakes, snowmelt, and human activities as frequent trigger mechanisms. Methods for this project will involve the mapping, compilation, and analysis of large and partly inhomogeneous landslide inventories from selected mountain belts in order to decipher change points in time series, non-stationary trends in landslide occurrence, and consequences for state-of-the-art landslide susceptibility and hazard analyses.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in quantitative geosciences, remote sensing, engineering geology, or landslide research. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with statistical software and learning, processing of large and inhomogeneous geodata is desirable. We expect a solid background in mathematics, programming skills, and interest in the quantitative assessment of geohazards and -risks. A basic knowledge of time-series analysis, data mining or machine learning, and modern risk concepts will be of advantage for this post.

PhD-project 155-P2/2015: Transient merging of two Rhine flow regimes from climate change

(Supervisors: Dr. Gerd Bürger, Prof. Dr. Axel Bronstert, University of Potsdam)

Responsibilities:

The PhD-project "Transient merging of two Rhine flow regimes from climate change" is based at the research team "Hydrology & Climatology" of the University of Potsdam. The PhD-project attempts to analyse and quantify the risk of











an emergence of a completely new hydrological regime of the river Rhine, which is the most densely populated an intensively navigated European River System. In the present climate, snow-melt induced (nival) early summer floods are seasonally well separated from rain-fed (pluvial) spring floods, and the risk of nival and pluvial types occurring together is negligible. The continued global warming has two effects: first, snowmelt occurs earlier in the year, and second, rainfall will be more intense. For late spring, consequently, the merging of nival and pluvial types and thus the formation of a completely new Rhine flow regime becomes a realistic scenario. This kind of future hydro-climatological conditions might cause disastrous consequences for all affected areas, in particular in the Middle Rhine and Lower Rhine regions.

Requirements:

We are seeking applications with a strong background in quantitative geo-ecology, hydrology or related science fields. The applicant should have experience with hydro-climatological data-analysis, hydrological of climate models (both model application and development) and their statistical evaluation. Willingness to work in an interdisciplinary team, including co-operations with international university groups, re-insurance companies and river boards is essential.

PhD-project 155-P3/2015: Spatio-temporal response of extreme precipitation to climate change and decadal climate variability

(Supervisors: Prof. Dr. Matthias Holschneider, University of Potsdam; Dr. Henning Rust, Prof. Dr. Uwe Ulbrich, FU Berlin)

Responsibilities:

The PhD-project "Spatio-temporal response of extreme precipitation to climate change and decadal climate variability" is a cooperation between the research team "Climate diagnostics and extreme meteorological events" at Freie Universität Berlin and "Applied Mathematics" at Potsdam University. It aims at a probabilistic description of extreme precipitation events for different durations. This description is to be linked to atmospheric drivers to assess the impact of a changing climate on the occurrence of extreme precipitation. Ultimately, we seek a spatial description for the occurrence frequency of extremes of various durations driven by large scale atmospheric patterns.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in meteorology, physics or applied mathematics. A good command of English (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with extreme value statistics and generalized linear models is desirable. Knowledge on Bayesian hierarchical modelling, hydro-meteorological hazards and risk assessment would be a plus.

PhD-project 155-P4/2015: Assessment of early-warning signals and tipping points of sudden ecosystem shifts causing rapid land degradation in drylands

(Supervisors: Dr. Eva Müller, Prof. Dr. Axel Bronstert, University of Potsdam; Dr. Saskia Förster, GFZ Potsdam)

Responsibilities:

The PhD-project "Assessment of early-warning signals and tipping points of sudden ecosystem shifts causing rapid land degradation in drylands" is based at the research team "Ecohydrological Feedback Group" of the University of Potsdam and the division of "Remote Sensing" at the GFZ Potsdam. The PhD-project aims at studying the dynamics of land degradation processes in dryland settings using a coupled temporal-spatial analysis of remotely sensed images and ecohydrological modelling of vegetation and water-stress patterns due to extreme climate conditions to identify early-warning signals and tipping points at which sudden shifts in the ecosystem occur.

Requirements:

We are seeking applications from highly motivated individuals with a strong background in geoecology, hydrology, remote sensing or landscape ecology. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with computer programming is required, knowledge in ecological or hydrological modelling and/or remote sensing image analysis techniques are desirable.

PostDoc-position 155-PDA/2015: Stationarity versus non-stationarity and the effect on respective probabilities

Responsibilities:

The PostDoc project "Stationarity versus non-stationarity and the effect on respective probabilities" is planned to take a leading role concerning the methodological comparison and integration of the different results from the PhDprojects of NatRiskChange. He/she will be based at the Institute of Earth and Environmental Sciences at University of Potsdam. Within NatRiskChange, this position aims at providing a robust statistical umbrella for the single PhDprojects with respect to the risk analysis. The main innovation lies in the non-stationary (transient) approach to the









respective hazard and risk, as compared to the classical, stationary one. Using established techniques of statistical null hypothesis testing, the project will formulate and conduct corresponding tests for several of the PhD-projects of NatRiskChange, and assess the added value of using a non-stationary approach.

Requirements:

We are seeking applications from highly motivated Post-Doc scientists with a strong background in statistical and time series analysis and a related PhD. The applicant should have some practice with real, preferably geophysical, data and their statistical evaluation, but also an appreciation for the intricacies of large data sets and corresponding methodological pitfalls. Fluency in the English language (speaking and writing) as well as willingness to work in an interdisciplinary team, including co-operations with international university groups, re-insurance companies and international administrations are essential. The position is for three years, with a possible extension of 1.5 years. The young scientist PostDoc will be able to work towards a habilitation in order to further qualify towards future academic profession. Very good opportunities will be offered to conduct her/his own research, to network and present at conferences and workshops.