

## Public Job Advertisement

In October 2015, the DFG Research Training Group “Natural Hazards and Risks in a Changing World” (NatRiskChange) was established at the University of Potsdam and is 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 considering the transient, non-stationary nature of hazards and risks due to changing natural and anthropogenically altered components of the earth system. Key scientific aims are the development, testing and pilot application of methods that are able to identify, quantify or predict transient natural hazards and associated risks. Earthquakes, floods, mass movements and storms are of major research interest.

Together with its partners, the University of Potsdam jointly offers the following positions in the DFG-Research Training Group “Natural Hazards and Risks in a Changing World” (NatRiskChange, GRK 2043/1):

### **12 Academic Staff Members (12 PhD-positions, part-time, 30 hours per Week - 75 % at the salary grade E 13 TV-L)**

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

- 239-I5/2018: Changes in European windstorm characteristics (Supervisors: Prof. Dr. Uwe Ulbrich, Dr. Henning Rust, FU Berlin)
- 239-I6/2018: Detecting time-dependent forcing of seismicity (Supervisors: Dr. Sebastian Hainzl, GFZ Potsdam; Prof. Dr. Matthias Holschneider, PD Dr. Gert Zöller, University of Potsdam)
- 239-I7/2018: Time dependent monitoring of active faults and landslides properties: developing new data processing approaches based on music information retrieval (MIR) strategies (Supervisors: Prof. Dr. Fabrice Cotton, GFZ Potsdam; Prof. Dr. Frank Scherbaum, Dr. Matthias Ohrnberger, University of Potsdam)
- 239-I8/2018: Learning landslide triggers from complex networks (Supervisors: Prof. Dr. Oliver Korup, University of Potsdam; Prof. Dr. Jürgen Kurths, PIK Potsdam)
- 239-I9/2018: Analysis of concurrent climate extremes driving land degradation and recovery in the Mediterranean regions (Supervisors: Prof. Dr. Eva Paton, TU Berlin, Prof. Dr. Axel Bronstert, University of Potsdam, Dr. V. Aich, WMO)
- 239-Q5/2018: Recurrence analysis of event-like hydrological data with uncertainties (Supervisors: Prof. Dr. Jürgen Kurths, PIK Potsdam; Prof. Dr. Bruno Merz, GFZ Potsdam, Dr. Norbert Marwan, PIK Potsdam)
- 239-Q6/2018: Investigation of interrelationships between floods and climate variability using multi-layer complex networks (Supervisors: Prof. Dr. Bruno Merz, GFZ Potsdam, Prof. Dr. Jürgen Kurths, Dr. Norbert Marwan, PIK Potsdam)
- 239-Q7/2018: Changes of vulnerability in respect to flood induced business interruption (Supervisors: Dr. Heidi Kreibich, GFZ Potsdam; Gert Zöller, University of Potsdam)
- 239-Q8/2018: Evolving Risks from Himalayan Glacial Outburst Floods (Supervisors: Prof. Dr. Ariane Walz, Prof. Dr. Oliver Korup, University of Potsdam; Dr. Sigrid Rössner, GFZ Potsdam)
- 239-P5/2018: Altered hydrological and sediment event dynamics in high alpine areas (Supervisors: Prof. Dr. Axel Bronstert, Dr. Theresa Blume, GFZ Potsdam)

- 239-P6/2018: Linking occurrence probabilities to large scale flow (Supervisors: Prof. Dr. Henning Rust, Prof. Dr. Uwe Ulbrich, FU Berlin)
- 239-P7/2018: Adaptation to flood risk - from quantification to prediction of adaptive behaviour of flood-prone residents (Supervisors: Prof. Dr. Annegret Thieken, University of Potsdam; Prof. Dr. Jeroen Aerts, VU/IVM Amsterdam; Dr. Philip Bubeck, University of Potsdam)

Responsibilities and requirements depend on the PhD-project and are outlined on the website <http://www.uni-potsdam.de/en/natriskchange/index/job-opportunities.html>. Candidates can apply for up to three projects and are expected to motivate their choice. The PhD-posts are part-time (75 %), fixed-term employment contracts for 3 years. The salary scale is TV-L E13. Employment in all positions shall begin at 1<sup>st</sup> October 2018. 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.

Applications should include the following components: CV, letter of motivation, research interests (specific interests and research plan for the chosen 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. Applications can only be submitted through <https://www.geo-x.net/natriskchange/>. Deadline for applications is **20<sup>th</sup> May 2018**.

#### **Description of the single posts:**

##### **PhD-Project 239-I5/2018: Changes in European windstorm characteristics**

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

##### **Responsibilities:**

The PhD-project “Changes in European windstorm characteristics” is based at the research team “Climate diagnostics and extreme meteorological events” of Freie Universität Berlin. European windstorms are known to be highly variable in terms of their overall severity, spatial extension, internal variability and duration at individual locations. These characteristics can be associated with the distribution of wind extremes within the storm field, which in turn has a certain form in space, and the progress of its overall location. The PhD-project aims at a quantification of these characteristics based on observed and simulated wind storms from ensemble predictions. An identification and understanding of the key parameters determining these characteristics is the goal of this project.

##### **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 239-I6/2018: Detecting time-dependent forcing of seismicity**

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

##### **Responsibilities:**

Seismicity data contain important information about localized transient processes such as magma intrusions, fluid flow, or slow slip events in the crust. This project aims at detecting and modelling the time dependent forcing

of seismicity based on the rate- and state-dependent friction (RS) model, which stems from laboratory-derived friction laws and predicts rate changes of seismicity as function of a time-dependent stressing history. For this aim, appropriate smoothing techniques such as e.g. splines or wavelets

have to be applied and the input parameters have to be determined for earthquake catalogue data. The model will be designed within a Bayesian framework in order to account for parameter uncertainties. The results will be finally used to deduce and reveal the underlying source processes in observational data sets.

**Requirements:**

We are seeking applications from highly motivated candidates with excellent Master's degree in mathematics, geosciences, physics or a related discipline. Programming skills are mandatory. Fluency in the English language

(speaking and writing) as well as the willingness to work in an interdisciplinary team are expected.

**PhD-project 239-I7/2018:** Time dependent monitoring of active faults and landslides properties: developing new data processing approaches based on music information retrieval (MIR) strategies (Supervisors: Prof. Dr. Fabrice Cotton, GFZ Potsdam; Prof. Dr. Frank Scherbaum, Dr. Matthias Ohrnberger, University of Potsdam)

**Responsibilities:**

The PhD-project "Time dependent monitoring of active faults and landslides properties: developing new data processing approaches based on music information retrieval (MIR) strategies" is based at the research teams "General Geophysics" of the University of Potsdam and "Seismic Hazard and Risk Dynamics" of the GFZ German Research Centre for Geosciences. Recent research results suggest that catastrophic events (e.g. earthquakes, landslides) are preceded by a preparation phase of several years. Small earthquakes, tremors, rock velocity changes occurring during this phase may provide key information about the time evolution of state active faults and landslides properties. In order to detect these time-changes we need to detect, record and analyse these tremors, micro-earthquakes and rock velocity changes. The goal of the PhD topic is thus to exploit the similarity of seismic and acoustic waveforms for information retrieval and to develop innovative seismological data processing methods for seismological monitoring purposes by borrowing from the expertise developed in the field of music information retrieval and audio signal processing.

**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 239-I8/2018: Learning landslide triggers from complex networks**

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

**Responsibilities:**

The PhD-project "Learning landslide triggers from complex networks" is based at the research team "Geohazards" of the University of Potsdam. The PhD-project aims at developing methods to identify from existing landslide catalogues those landslides that have the highest likelihood of having had a rainfall trigger, and thus separate them from co-seismic landslides. Methods for this project will involve the analysis of large and partly inhomogeneous landslide inventories from selected mountain belts using complex spatially embedded networks, and probabilistic classification methods using Bayesian Reasoning and Machine Learning.

**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. Basic knowledge of time-series analysis, data mining or machine learning, and modern risk concepts will be of advantage for this post.

**PhD-project 239-I9/2018: Analysis of concurrent climate extremes driving land degradation and recovery in the Mediterranean regions**

(Supervisors: Prof. Dr. Eva Paton, TU Berlin, Prof. Dr. Axel Bronstert, University of Potsdam, Dr. V. Aich, WMO)

**Responsibilities:**

The PhD-project “Analysis of concurrent climate extremes driving land degradation and recovery in the Mediterranean regions” is based at the research team “Ecohydrology and Landscape Evaluation” of the TU Berlin in close collaboration with the University of Potsdam and the World Meteorological Office in Geneva.

The PhD-project aims at studying the effects of simultaneous, successional or compound extreme climatic events on dryland ecosystems and their ecosystem functions. This study will focus on analysing changes in concurrences of several variables, such as meteorological and hydrological droughts, flash floods due to extreme rainfall, heatwaves and vegetation degradation status for the last 40 years in selected catchments with a focus on eastern Mediterranean regions. Analysing these historical changes in concurrent climate extremes is critical to prepare for detrimental impacts of climatic destabilisation as it will allow identifying windows of risks, where an ecological degradation shift is likely to occur and windows of opportunity, where an ecosystem recovery shift would be most successful when combined with land-use change adaptation measures.

**Requirements:**

We are seeking applications from highly motivated individuals with a strong background in hydrology, geoecology, ecology, climatology or environmental science. Fluency in the English language (speaking and writing) as well as the willingness to work in an interdisciplinary team are essential. Experience with data management, computer programming (e.g. R CRAN) and statistics software is required, knowledge in time series analysis and remote sensing are desirable.

**PhD-project 239-Q5/2018: Recurrence analysis of event-like hydrological data with uncertainties**

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

**Responsibilities:**

The PhD-project “Recurrence analysis of event-like hydrological data with uncertainties” is based at the research team at PIK. The PhD-project aims at better understanding and quantifying temporal changes and drivers of flood hazard. Recurrence analysis, a novel and powerful method to investigate dynamics, transitions, and even indirect couplings, will be used to compare the recurrence properties of different potential drivers and to identify potential couplings. Further methodological developments of this technique will extend its capabilities to study event-like data (extreme events), data with uncertainties, and spatio-temporal recurrences.

**Requirements:**

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

**PhD-project 239-Q6/2018: Investigation of interrelationships between floods and climate variability using multi-layer complex networks**

(Supervisors: Prof. Dr. Bruno Merz, Prof. Dr. Jürgen Kurths, Dr. Norbert Marwan, PIK Potsdam)

**Responsibilities:**

The PhD-project “Investigation of interrelationships between floods and climate variability using multi-layer complex networks” is based at the section Hydrology at GFZ. Unusually large floods in drainage basins of all sizes can be related to large-scale atmospheric circulation anomalies. However, their impact depends on further factors that can even change over time, thus resulting in more or less strong consequences of floods. Such factors are, for example, catchment wetness or timing of snowmelt, and can be clearly linked to climate change and climate variability. The project



will apply a multi-layer complex network approach to investigate the interrelationship between floods, large-scale atmospheric circulation anomalies and potential influencing factors.

**Requirements:**

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

**PhD-project 239-Q7/2018: Changes in vulnerability with respect to flood induced business interruption**

(Supervisors: Dr. Heidi Kreibich, GFZ Potsdam; Gert Zöller, University of Potsdam)

**Responsibilities:**

The PhD-project “Changes of vulnerability in respect to flood induced business interruption” is based at the section 5.4 Hydrology of the German Research Centre for Geosciences GFZ. The PhD-project will extensively analyse past changes in vulnerability in respect to flood induced business interruption. First, the effect of the most important variables determining duration and resulting costs of flood induced business interruption will be quantified; second: potential temporal changes in business interruption will be analysed (detection of change); thirdly: the main drivers of change will be identified (attribution). Bayesian statistics and data mining techniques such as decision trees, Bayesian networks will be used.

**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 statistics/networks and programming in R is an asset. We expect a strong interest in flood risk and vulnerability research.

**PhD-project 239-Q8/2018: Evolving risks from Himalayan glacial outburst floods**

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

**Responsibilities:**

The PhD-project “Evolving risks from Himalayan glacial outburst floods” is based at the research team “Landscape Management” of the University of Potsdam. The PhD-project aims at estimating the frequency and magnitude (peak discharge, water and sediment volumes) of GLOFs for the Himalayan region from a new (and more) complete time series of events derived from LANDSAT satellite imagery. Another key goal is to evaluate the exposure and risk for various GLOF inundations scenarios for the city of Pokhara, Nepal, informed by numerical modelling, field-surveyed data, and satellite-derived urban growth and populations density data. Methods involve hydraulic flood modelling, multivariate estimates of peak discharge from topographic and dam-geometry predictors, contemporary urban growth, and land-use change analyses using Sentinel data to feed probabilistic risk models.

**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. Basic knowledge of geomorphology, glaciology, and modern risk concepts will be of advantage for this post.

**PhD-project 239-P5/2018: Altered hydrological and sediment event dynamics in high alpine areas**

(Supervisors: Prof. Dr. Axel Bronstert, Prof. Dr. Oliver Korup, University of Potsdam, Dr. Theresa Blume, GFZ Potsdam)

**Responsibilities:**

Collection of hydro-sedimentological data in high mountain areas, application and further development of hydro-sedimentological models, data analysis, publication of results in scientific journals.

**Requirements:**

We are seeking applications of candidates with a strong background in quantitative geo-ecology, hydrology or related science fields. The applicant should have experience with data-analysis, statistical methods, (hydrological) modelling, and field work. Willingness to work in an interdisciplinary team, including co-operations with research groups from Austria and Switzerland is essential.

**PhD-project 239-P6/2018: Linking occurrence probabilities to large scale flow**

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

**Responsibilities:**

The PhD-project "Linking occurrence probabilities to large scale flow" is a cooperation between the research team "Climate diagnostics and extreme meteorological events" at Freie Universität Berlin and "Applied Mathematics" at University of Potsdam. It addresses exceedance probabilities for extremes of meteorological parameters as an important basis for risk assessment. Maps of return levels based on station observations shall be produced by setting up (parametric) linear models for the parameters of the extreme value distribution, taking spatial covariates into account. Such covariates may include local (e.g. orography) and large scale (e.g. NAO index) variables. This approach shall then allow to obtain small-scale occurrence probabilities from global climate projections without the need for a costly high resolution dynamical nesting.

**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 239-P7/2018: Adaptation to flood risk - from quantification to prediction of adaptive behaviour of flood-prone residents**

(Supervisors: Prof. Dr. Annegret Thieken, University of Potsdam; Prof. Dr. Jeroen Aerts, VU/IVM Amsterdam; Dr. Philip Bubeck, University of Potsdam)

**Responsibilities:**

The PhD-project "Adaptation to flood risk – from quantification to prediction of adaptive behaviour of flood-prone residents" is based at the research team "Geography and Risk Research" of the University of Potsdam and will be co-supervised by the Institute of Environmental Studies (IVM) at the Vrije Universiteit Amsterdam, the Netherlands. The aim of this PhD-project is to develop a flood risk model that incorporates precautionary and preparatory behaviour of residents and thus allows a prediction of adaptive behaviour in flood-prone regions. Model development and validation will be based on cross-sectional and longitudinal survey data among residents that experienced damaging flood events in Germany between 2002 and 2016. The application of agent-based modelling is foreseen. Furthermore, it is aimed to study different adaptation options in a scenario framework.

**Requirements:**

We are seeking applications from highly motivated individuals with an excellent diploma/master's degree in environmental sciences, applied mathematics, quantitative geosciences, data sciences or related fields with a strong background in multivariate statistics, machine learning, and modelling. Programming skills are essential; experiences with agent-based modelling and GIS are desired. Fluency in the English language (speaking and writing) as well as the willingness to work in



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an interdisciplinary team are essential. We expect a strong interest in flood vulnerability and adaptation research including psychological and behavioural aspects.

Potsdam, 10<sup>th</sup> April 2018