
The **Technische Universität München** TUM is one of the first three Universities of Excellence in Germany. The TUM School of Life Sciences Weihenstephan WZW is specialised on the major geopolitical challenges of the 21st century, especially on pressing issues of global change and food security.

In the project **Bavarian landscapes under climate change - carbon and nitrogen mobility in landscapes in transition based on colluvial and alluvial processes**

headed by Prof. Dr. Jörg Völkel, Prof. Dr. Ingrid Kögel-Knabner, Prof. Dr. Hans Peter Schmid (KIT/TUM)

the following positions will be available from **1 January 2015** or later as soon as possible, subject to final approval by the funding organization

# 1 PostDoc (E13 TV-L, full-time, temporary)

**and**

# 3 PhD students (E13 TV-L, 75%, temporary)

**Job Description PostDoc**

Scientific participation and coordination of the joint project with own professional focus in the fields of geomorphology and soil science. The field work will take place in Upper Bavaria and the Upper Palatinate. The sites are located in the TUM-Critical Zone Observatory (CZO-TUM, www.czo.wzw.tum.de), which is part of the international Critical Zone Environmental Network CZEN (www.czen.org) and closely connected to the TERENO network of the Helmholtz Association of German Research Centres HGF (http://teodoor.icg.kfa-juelich.de/observatories/BAPA_Observatory).

**TASKS**

- Project implementation including coordination and management of field and laboratory work
- Obtaining permits, dealing with authorities and owners
- Reporting and preparation of publications
- Development of further research collaborations
- Co-supervision of graduate students, M.Sc. and B.Sc. Candidates
- Organisation of workshops
- Participation in teaching for personal qualification (2-4 hours/week)

**REQUIREMENTS**

- PhD geomorphology, soil science, geology or related subjects
- Very good geomorphological and pedological field knowledge
- Very good skills in geophysical prospection of the shallow subsurface (GPR, ERT, SSR etc.)
- Very good knowledge of pedological and sedimentological analysis (field and laboratory)
- Very good knowledge of GIS
- Profound knowledge in the field of (cultural) landscape genesis and (paleo) ecosystem research
- Willingness to lead a work group, especially in the field
- Very good English skills, communication skills and willingness to work in a team
- Driving licence


**Job Description PhD student in geomorphology and soil science (Prof. Dr. Jörg Völkel)**

The PhD student works at the Department of Geomorphology and Soil Science at TUM Weihenstephan (http://geomorphologie.wzw.tum.de/) in **subproject 1 "Structure of the shallow subsurface and pedogenesis based on colluvial and alluvial processes"** in close cooperation with the other project partners.

The sub-project requires interdisciplinary work in the fields of geomorphology and soil science. The field work will take place in Upper Bavaria and the Upper Palatinate. The sites are located in the TUM-Critical Zone Observatory (CZO-TUM, www.czo.wzw.tum.de), which is part of the International Critical Zone Environmental Network CZEN (www.czen.org) and closely connected to the TERENO network Helmholtz Association of German Research Centres (http://teodoor.icg.kfa-juelich.de/observatories/BAPA_Observatory). Material translocation as a result of land use has a significant influence on soil development and C-content. The geomorphodynamics controlling erosion and deposition is among other factors largely controlled by relief and the shallow subsurface. To schematically describe the landscape in terms of these characteristics, sequences of soil profiles along geomorphic gradients in the form of catenas will be created. The classical orientation leads from the summit via the different slope sections (upper, middle, lower slope) to the alluvial plain. Via profile analysis (Pedon) catenas provide generalisable statements for a given type of landscape regarding soil genesis as well as material flows of all kinds. They are outstanding geoarchives for the reconstruction of system states and process changes in the course of changing parameters of the land use history. C-rich colluviums occur on a slope in the form of a cascade model as C-sinks and C-sources. Floodplain sediments show a multilayered structure. 14C-dating allows age determination and supports the accounting. For recent processes in the last decades Cs137 is used as a tracer. The shallow subsurface and its structure is prospected minimally invasive and illustrated using geophysical methods such as seismic refraction (SSR), electrical resistivity tomography (ERT) and ground penetrating radar (GPR). The location of catenas takes place in close collaboration with preset measuring locations of TP 3. Of particular importance for TP 2 is the change of lithology (carbonate-rich, well-buffered system in the Alpine foreland versus crystalline-siliceous, acid system in the Bavarian Forest).

**TASKS**

- Execution of a doctoral thesis at TUM Graduate School
- Co-organization and implementation of field campaigns and participation in the laboratory
- Independent scientific work
- Generation of high quality data on geomorphodynamics, sediment transport, weathering and soil formation processes in the geoarchive-system slope-floodplain in selected areas
- Analysis and interpretation of these data in terms of the sediment and soil genesis and the use of these results in the context of prognostic scenarios for landscape change
- Assisting with reports and independent publishing
- Participation in teaching for personal qualification (approximately 2 hours per week)

**REQUIREMENTS**

- Completed Diploma / Master's degree with honours in physical geography, geosciences, soil science, geoecology or related disciplines
- Sound geomorphological, sedimentological and pedological knowledge of Quaternary and paleo-ecosystem research
- Very good knowledge of pedological and sedimentological analysis (field and laboratory)
- Good knowledge in geophysical prospection (GPR, ERT, SSR, etc.) and GIS desirable
- Knowledge of remote sensing of advantage
- Willingness to conduct field work lasting several weeks
- Very good English skills, communication skills and willingness to work in a team
- Driving licence


**Job Description PhD student in soil science with an emphasis on carbon (Prof. Dr. Ingrid Kögel-Knabner)**

The PhD student works at the Department of Soil Science at TUM Weihenstephan (http://www.soil-science.com) in **subproject 2 "Carbon and nitrogen conditions in soils formed in erosional-depositional environments"** in close cooperation with the other project partners.

The field work will take place in Upper Bavaria and the Upper Palatinate. The sites are located in the TUM-Critical Zone Observatory (CZO-TUM, www.czo.wzw.tum.de), which is part of the International Critical Zone Environmental Network CZEN (www.czen.org) and closely connected to the TERENO network Helmholtz Association of German Research Centres (http://teodoor.icg.kfa-juelich.de/observatories/BAPA_Observatory). At selected profiles of the catenas, representing both alluvial and colluvial parts in the study area, the quantities and stocks of C (organic and inorganic) and N will be determined. By means of a combined physical fractionation according to particle size and density, the proportions of labile, intermediate and stable C are detected quantitatively. For the long-term sequestration of C in soil organo-minerally bound C is of particular importance. Moreover, the stoichiometric ratios of elements C and N are determined in relation to the C-storage capacity. The N-storage dynamics in topsoil and subsoil is investigated analogously. Therefore it is necessary for these soils to investigate the following aspects: humus content and condition in the soils of the various erosional-depositional environments, humus distribution in the soil profile depending on the parent material (crystalline vs. carbonatic-dolomitic), humus distribution and condition depending on the location within the erosion-accumulation-system in the catena, estimation of C-saturation as function of the mineralogical conditions and organic matter surface saturation.

**TASKS**

- Execution of a doctoral thesis at TUM Graduate School
- Co-organization and implementation of field campaigns and participation in the laboratory
- Independent scientific work
- Data generation on humus condition and carbon storage in selected catenas
- Assisting with reports and independent publishing
- Participation in teaching for personal qualification (approximately 2 hours per week)

**REQUIREMENTS**

- Completed Diploma / Master's degree in one of the following disciplines: geography, geosciences, agricultural or forestry sciences, environmental sciences, geoecology or related disciplines
- In-depth knowledge of soil science
- Very good knowledge in soil science analysis (field and laboratory)
- Willingness to conduct field work lasting several weeks
- Very good English skills, communication skills and willingness to work in a team
- Driving licence

**Job Description PhD student / in C & N fluxes (Prof. Dr. Hans Peter Schmid)**

The PhD student works in **sub-project 3 "Soil-atmosphere exchange of C and N-containing trace gases"** in close cooperation with the other project partners.

The sub-project requires interdisciplinary work in the fields of biogeochemistry and micro-meteorology. The field work will take place in Upper Bavaria and the Upper Palatinate. The sites are located in the TUM-Critical Zone Observatory (CZO-TUM, www.czo.wzw.tum.de), which is part of the International Critical Zone Environmental Network CZEN (www.czen.org) and closely connected to the TERENO network Helmholtz Association of German Research Centres (http://teodoor.icg.kfa-juelich.de/observatories/BAPA_Observatory). The topic of this PhD project is the investigation of C and N budgets in response to gradients of pedogenesis and the C and N content along colluvially and alluvially influenced catenas. The set-up and characterization of catenas is done by the partners in sub-projects 1 and 2. The exchange of the main C- and N-containing trace gases between the atmosphere and


ecosystems (soils and vegetation) will be determined site-specific and quantitative using Eddy-Covariance- and cover technology. This work is done in close cooperation with the trace gas measurement program in the TERENO prealpine Observatory. These measurement results are accompanied and complemented by numerical modelling of the biological, biochemical and physical processes responsible for the exchange. Among other things, the effects of daily and seasonal cycles, weather, phenology, nutrient availability, as well as longer-term climatic trends on the carbon and nitrogen budgets of these ecosystems will become apparent. Apart from field work the work place for this PhD is on KIT-campus Alpine (Atmospheric Environmental Research) in Garmisch-Partenkirchen.

**TASKS**

- Execution of a doctoral thesis at TUM Graduate School
- Co-organization and implementation of multi-day field campaigns and laboratory work
- Measurement and modeling of C and N budgets for the project sites
- Independent scientific work
- Assisting with reports and independent publishing

**REQUIREMENTS**

- Completed Master's degree in environmental sciences, geoecology or related disciplines
- Demonstrated knowledge of biogeochemical processes in terrestrial ecosystems; experience in ecosystem modelling is of advantage
- Experience in experimental field work with gas exchange measurements and / or micro-meteorology
- Good knowledge of English, communication skills and willingness to work in a team
- Driving licence

**We offer** the opportunity for academic work and further qualification at the forefront of science in an interdisciplinary-operating team at TUM research campus Weihenstephan and the KIT Institute for Atmospheric Environmental Research IMK-IFU in Garmisch. Place of employment is Freising-Weihenstephan. The Technische Universität München offers an excellent research environment for young researchers. TUM-graduate students are part of the TUM Graduate School (www.gs.tum.de). In addition, they are given the opportunity to be included in the Helmholtz Research School MICMoR as Resident Fellows (Mechanisms and Interactions of Climate Change in Mountain Regions; www.micmor.kit.edu). The positions are limited to 3 years. The TU München aims to increase the proportion of women, qualified women are therefore strongly encouraged to apply. Handicapped applicants will be preferred in case of equal suitability and qualification.

For more information please contact Dr. Eden (tel +49 71 8161 2506, email: marie.eden-at-tum.de). The appointment procedures begin two weeks after the publication of the tender and continue until the positions are filled in. Please send your complete application (including motivation letter, CV, publication list, overview of funded projects, copies of certificates, two references) in electronic form (pdf) to:

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