



*Opportunities
for Talents*



Technische Universität München

The **Technical University of Munich (TUM)** is one of Europe's top universities. It is committed to excellence in research and teaching, interdisciplinary education and the active promotion of promising young scientists. The university also forges strong links with companies and scientific institutions across the world. TUM was one of the first universities in Germany to be named a University of Excellence. Moreover, TUM regularly ranks among the best European universities in international rankings. - The TUM School of Life Sciences on the TUM Campus Weihenstephan is specialised on the major geopolitical challenges of the 21st century, especially on pressing issues of global change and food security.

The interdisciplinary joint project **Landscapes under Climate Change - Influence of management and climate change on interactions of terrestrial and aquatic ecosystems**

is headed by Prof. Dr. Jörg Völkel (Coordinator), PD Dr. Michael Dannenmann (Karlsruhe Institute of Technology), Prof. Dr. Jürgen Geist, Prof. Dr. Dr.h.c. Ingrid Kögel-Knabner & Prof. Dr. Michael Schloter.

Climate change influences the (nutrient) matter balance in the near subsurface, and therefore the interaction patterns between terrestrial and aquatic ecosystems in cultural and natural landscapes will change and put ecological and economic soil functions and ecosystem services at risk. C, N, P compounds play a prominent role in the search for mitigation and adaptation strategies. Changes in the metabolic balance of soils and soil-borne sediments are closely linked to changes in the microbiome. The complex interaction patterns in the near subsurface (critical zone) of terrestrial ecosystems are directly linked to aquatic ecosystems via substance inputs to water bodies, whose biodiversity is particularly at risk. In cultural landscapes, the form of land use is of utmost importance, especially grassland and its management. In search of suitable mitigation strategies, the project investigates these changes in the sink and source function of the C, N, P reservoirs along a climatic gradient in the Bavarian Forest near Regensburg from the montane to the colline stage within the same natural unit. In the context of the project, quasi-natural grassland sites without current and without previous soil management form the reference conditions. They are contrasted with long-term intensively used sites. On the basis of these scenarios, the interactions between landscape and climate will be illuminated and, in comparison with the corresponding regulations such as the Water Framework Directive and the Soil Protection Ordinance, management strategies will be developed with the aim of maintaining soil functions under climate change conditions and reducing undesirable inputs from terrestrial to aquatic systems. In addition to cultural landscape genesis, the structure of the near-surface subsurface with material stocks, layer structure, weathering phenomena, pedogenesis and slope water flow is of fundamental importance. Hence, the interdisciplinary project combines the competences of geomorphology, soil science, microbiology, stable isotope biogeochemistry, hydrology and aquatic systems biology.

The following positions will be available from **February 1st, 2022** or later as soon as possible, subject to final approval by the funding organization

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

and

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



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Job Description PostDoc (Prof. Dr. Jörg Völkel)

The PostDoc works at the Division of Geomorphology and Soil Science, TUM Campus Freising-Weihenstephan. Together with the coordinator and the five principal investigators the successful applicant coordinates the joint project as contact person for all doctoral students. Scientific participation with own professional focus in the fields of geomorphology and soil science is expected.

TASKS

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

REQUIREMENTS

- PhD geomorphology, soil science, geology or related subjects
- Knowledge in the field of (cultural) landscape genesis and (paleo) ecosystem research
- Knowledge of pedological and sedimentological analysis (field and laboratory)
- Ability to use geophysical prospection (GPR, ERT, SSR etc.)
- Ability to use GIS
- 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 Geomorphology & Soil Science (Prof. Dr. Jörg Völkel)

The PhD student works in the labs of Prof. Jörg Völkel at TUM's Campus of Life Sciences in Freising-Weihenstephan (<http://geomorphologie.wzw.tum.de/>). The PhD student will be responsible for sampling and analysing sediments and soils characterizing the structure of the shallow subsurface, pedogenesis, and (cultural) landscape development within different time scales in close collaboration with the other subprojects. This includes physicochemical analysis on sediment and soil samples, geophysical prospection modelling the shallow subsurface, and geomorphological analysis.

TASKS

- Participation in geomorphological field work and geophysical prospection
- Sample preparation and physicochemical analysis of sediments and soils
- Data processing of geophysical measurements
- Publication and presentation of the data
- Participation in teaching for personal qualification is possible

REQUIREMENTS

- MSc in one of the following disciplines: physical geography, geosciences, soil science, geoecology or related disciplines
- Knowledge in geomorphology and soil/sediment analysis (field and laboratory)
- Ability to use geophysical methods (e.g. ERT, SSR, GPR)
- Ability to use GIS desirable
- Willingness to work in an interdisciplinary environment
- Very good English skills
- Driving licence



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Job Description PhD Soil Science (Prof. Dr. Ingrid Kögel-Knabner)

The PhD student will work in the labs of Prof. Ingrid Kögel-Knabner at TUM's Campus of Life Sciences in Freising-Weihenstephan (www3.ls.tum.de/en/boku/). The PhD student will be responsible for sampling and analysing soils planned in the frame of the project in close collaboration with the other subprojects. This includes the physical fractionation and analysis of bulk soils, sediment samples and physical fractions for C, N and P. Focus is on the stocks as well as the stoichiometric relations between these elements, including participation in a ¹⁵N field labelling experiment.

TASKS

- Participation in soil and water sampling campaigns
- Sample preparation, fractionation and analysis
- Multivariate statistical analysis of the data together with the other working packages
- Publication and presentation of the data
- Participation in teaching for personal qualification is possible

REQUIREMENTS

- MSc in one of the following disciplines: geography, geosciences, agricultural or forestry sciences, environmental sciences, geoecology or related disciplines
- Knowledge in soil science and soil analysis (field and laboratory)
- Ability to use tools like R
- Basic cognition in multivariate statistics
- Willingness to work in an interdisciplinary environment
- Very good English skills
- Driving licence

Job Description PhD Aquatic Systems Biology (Prof. Dr. Jürgen Geist)

The PhD student will work in the laboratories of Prof. Jürgen Geist at TUM's Campus of Life Sciences in Freising-Weihenstephan (www3.ls.tum.de/aquasys/). The PhD student will be responsible for the in-stream sampling and analyses in close collaboration with the other sub-projects. Specific tasks comprise analyses of abiotic properties of the stream bed (e.g., redox potentials, chemical analyses of samples from open water and interstitial), bioindication experiments as well as biological analyses along the aquatic food web (e.g., periphyton and macroinvertebrates) including preparation and analyses of samples for microbial and stable isotopes.

TASKS

- Installation of probes and water sampling devices
- Participation in water sampling campaigns
- Abiotic characterization of sites (e.g., flow, redox potential, temperature, nutrients)
- Application of bioindication experiments
- Biological sampling (periphyton, macroinvertebrates) and species determination
- Multivariate statistical analysis of the data together with the other working packages
- Publication and presentation of the data

REQUIREMENTS

- MSc in aquatic ecology or related subjects
- Practical skills in limnological field work and species identification, especially related to periphyton and macroinvertebrates
- Interest in combining field experimentation, laboratory analyses and statistics
- Basic statistical knowledge (e.g., PRIMER, R)
- Willingness to work in an interdisciplinary environment
- Very good English skills
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Job Description PhD Microbiology (Prof. Dr. Michael Schlöter)

The PhD student will work in the labs of Prof. Michael Schlöter at the Helmholtz Zentrum München, which is located between downtown Munich and the TUM campus in Freising-Weihenstephan. The PhD student will be responsible for all microbiome analysis planned in the frame of the project. This includes the analysis of soil microbiomes and microbiomes in sediments, as well as host – microbe interactions in the rhizosphere of selected plant species and biota living in the water body. Focus will be given on those microbes, which drive nutrient turnover. The toolbox which will be applied includes molecular methods to analyse metagenomes and –transcriptomes.

TASKS

- Participation in soil and water sampling campaigns
- Bio-archiving of samples
- Extraction of nucleic acids from samples
- Application of metabarcoding approaches to define microbial community structure
- Use of metagenomics and metatranscriptomics to assess key microbial functions and to reconstruct microbial nutrient cycle
- Multivariate statistical analysis of the data together with the other working packages
- Publication and presentation of the data

REQUIREMENTS

- MSc in microbiology or related subjects
- Practical skills in molecular biology
- Basic knowledge in bioinformatics (e.g. the use of Qiime or MgRast)
- Ability to use tools like R
- Basic cognition in multivariate statistics
- Willingness to work in an interdisciplinary environment
- Very good English skills,
- Driving licence



Job Description PhD Stable Isotope Biogeochemistry (PD Dr. Michael Dannenmann)

The PhD student will work in the labs of PD. Michael Dannenmann at the Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research / Atmospheric Environmental Research (KIT/IMK-IFU) at Campus Alpin in Garmisch-Partenkirchen, Germany, (<https://www.imk-ifu.kit.edu/bgc.php>). Garmisch-Partenkirchen is located ca 80 km South of Munich. The PhD student will be responsible for 1) Tracing the fate of isotopically labelled fertilizer along transitions between terrestrial and aquatic systems; 2) Quantification of C, N and P matter fluxes between terrestrial and hydrological systems under different climate and management intensity; 3) Testing of different grassland management practices with regard to effects on plant nitrogen use efficiency, yield and fodder quality, soil nitrogen retention, and gaseous and hydrological nitrogen losses.

We offer state of the art technical research infrastructure, advanced training and supervision, close cooperation and interaction with the interdisciplinary partners, and a vibrant and friendly, international research environment in the beautiful surroundings of Garmisch-Partenkirchen, Germany. For more information please contact PD Dr. Michael Dannenmann (michael.dannenmann@kit.edu).



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TASKS

- Participation in soil and water sampling campaigns, laboratory work, analytics, data analysis
- Co-coordination of a field ^{15}N stable isotope tracing experiment
- Compound-specific ^{15}N tracing in soil, water and plants
- Multivariate statistical analysis of the data together with the other working packages
- Publication and presentation of the data

REQUIREMENTS

- Strong interest and practical experience in ecosystem biogeochemistry, preferably including the use of ^{15}N stable isotopes in tracing experiments
- A MSc degree (or equivalent) in a relevant discipline
- Good lab skills and an aptitude for fieldwork in mountainous regions
- Basic cognition in data handling and multivariate statistics
- Willingness to work in an interdisciplinary and international environment
- Very good oral and written English skills
- Driving licence

All positions (1 PostDoc, 5 PhD) are limited to 3 years. TUM and KIT strive to achieve gender balance at all levels of employment. We therefore particularly encourage female candidates to apply for this position. With appropriate qualifications, applications from persons with handicaps will be treated with preference.

The appointment procedures begin four weeks after the publication of the tender, respectively **October 18th 2021**, and continue until the positions are filled in. If you are interested, please send your complete application with CV, letter of motivation, a brief statement of research experiences and interests, diplomas and the names and contact information of two references in a single PDF file to geo@wzw.tum.de

Contact:

Technische Universität München

Extraordinariat für Geomorphologie und Bodenkunde

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