With its 3,800 employees and 30,000 students, the University of Graz provides an exciting and varied work environment. Due to our research and teaching competence we are a central institution for guaranteeing that Styria remains a research and education location.

The University of Graz is looking for PhD students for twenty

PhD student positions (project assistant without doctorate) in the interdisciplinary Doktoratskolleg "Climate Change – Uncertainties, Thresholds and Coping Strategies"

(30 hours a week; fixed-term employment for the period of three years; twenty positions to be filled as of September 3rd 2018)

The Doktoratskolleg Climate Change (DK, mainly funded by the Austrian Science Foundation) is an interdisciplinary PhD programme and provides independent and cooperative research in the field of physical climate science, meteorology and hydrology, system sciences, sustainability sciences, theories of justice, ethics, environmental law and economics of climate change. The thesis work has to be done on one of the research topics which contribute to answering the general research questions of the DK Climate Change: What are scientifically sound, efficient and ethically defensible strategies for a transition towards a low-carbon and climate-robust economy and society and how can the necessary qualitative transformation be politically and legally implemented and legitimated? How should we deal with uncertainties and risks related to hydro-meteorological changes, in particular extreme events, and their associated consequences?

More information on the DK faculty members and PhD thesis topics is available at https://dk-climate-change.uni-graz.at/en/.

The stimulating diversity of research areas covered by the faculty of the DK provides an outstanding interdisciplinary environment where students of different disciplines may find exciting research topics and excellent guidance for their doctoral studies. The DK offers interdisciplinary seminars and colloquia, summer schools and workshops, as well as disciplinary training in the respective fields. The PhD programme aims at training a selected group of outstanding PhD students for a professional career in universities, public and private research organizations, international institutions, consultancy and business, and the government.
The DK is offering twenty fully-funded PhD student positions, with contracts starting in autumn 2018 for three years (extendable by half a year in exceptional cases). The positions come with social insurance. In addition the DK provides funds for conference participation, visits, and research stays abroad.

Your duties
• Pursuing a PhD project within the Doktoratskollegs "Climate Change – Uncertainties, Thresholds and Coping Strategies"
• Participating in the training programme of the Doktoratskolleg

Your profile
• Master's degree (or equivalent) in any discipline of the above mentioned fields of research
• Knowledge in English at level C1
• For eventual requirements for skills in German at level C1, candidates will be contacted before the interviews, as these depend on which disciplinary doctoral study programme the PhD candidate would be located in, complementary to the interdisciplinary DK.

The applications have to contain the following documents in one pdf:
1. a motivation letter
2. indication of your first and second preference in PhD thesis topics and/or supervisors (see https://dk-climate-change.uni-graz.at/en/thesis-topics/call-for-applications-2018/ for an overview),
3. an abstract in English of the master thesis including a web-link or ftp-link to an electronic copy of the thesis,
4. a Curriculum Vitae including information on previous work experience and publications and a transcript of records,
5. evidence for knowledge in English at level C1 or higher (e.g., suitable IELTS, TOEFL, or EFL certificate and/or brief justification letter summarizing the experience)
6. two letters of recommendation.

The selection procedure will commence immediately after the application deadline, with interviews to be expected in April 2018, and decision on appointment in May 2018. All communication, including interviews, will be conducted in English.

For further information, please contact dk.climate-change@uni-graz.at.

Information for international students about admission to doctoral studies, dates and deadlines is available at:
https://studienabteilung.uni-graz.at/en/international-students/admission-guide/ and
https://welcome.uni-graz.at/en/studying/doctoral-programmes/admission-process/

Classification

Salary scheme of the Universitäten-KV (University Collective Agreement): B1

Minimum salary

The minimum salary as stated in the collective agreement and according to the classification scheme is EUR 2096.00 gross/month. This minimum salary may be higher due to previous employment periods eligible for inclusion and other earnings and remunerations.

We offer you a job with a lot of responsibility and variety. You can expect an enjoyable work climate, flexible work hours and numerous possibilities for further education and personal development. Take advantage of the chance to enter into a challenging work environment full of team spirit and enthusiasm for your job.

Application Deadline: **April 18th 2018**
Reference Number: **MB/52/99 ex 2017/18**

The University of Graz strives to increase the proportion of women in particular in management and faculty positions and therefore encourages qualified women to apply.

Especially with regard to academic staff, we welcome applications from persons with disabilities who meet the requirements of the advertised position.

If you are interested, please submit your application documents within the stated deadline to:

bewerbung@uni-graz.at

Karl-Franzens-Universität Graz
Personalressort
Universitätsplatz 3
8010 Graz

Impact of extreme events and changing environmental conditions on groundwater recharge

Main Supervisor: **Steffen Birk** [**showcase 1**]
Research field "Meteorology and hydrology: Groundwater resources in climate change"
Research question 2 | Cluster 1
Links to showcases Foelsche 1, Foelsche 2, Kirchengast 1, Kirchengast 2, Maraun 1, Steiner 2

Background: Current hydrological models frequently rely on simplifying approaches for calculating evapotranspiration such as correlations between evapotranspiration rates and air temperature. If the environmental conditions change strongly these approaches are subject to high uncertainty, first because of the impact of climate parameters other than temperature, and second because of changes in the soil-vegetation system. For instance, it has been suggested that the increasing carbon dioxide content of the air has reduced the transpiration by plants ("physiological forcing") and thus caused globally increasing continental runoff during the last decades despite the rising air temperatures (Gedney et al., 2006). This leads to the following research question: How is evapotranspiration and hence groundwater recharge affected by climate change taking into account changes in hydrological extremes and the responses of the soil-vegetation system to changing environmental conditions?

Goal: This thesis aims, first, to identify how groundwater level and discharge responded to extreme events in the past; second, to provide a quantitative understanding of the recharge mechanisms underlying the observed responses; and third, to assess potential impacts of future changes in the soil-vegetation system on evapotranspiration and groundwater recharge processes.

Methods and disciplinary background: Observed time series of groundwater level and spring discharge will be used to analyze (e.g., as in Healy and Cook, 2002; Geyer et al., 2008) how groundwater recharge responded to hydro-meteorological extreme conditions and to identify potential changes in these responses over the last decades. A process-based soil hydrological model will be employed to improve the understanding of the mechanisms controlling evapotranspiration and seepage flow in the soil under the observed extreme conditions as well as under future changing environmental conditions.

References:

Gedney, N.; Cox, P. M.; Betts, R. A.; Boucher, O.; Huntingford, C.; Stott, P. A. (2006): Detection of a direct carbon dioxide effect in continental river runoff records. Nature 439 (7078): 835-838. DOI:10.1038/nature04504

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Sustainable use of groundwater resources under changing climate conditions and the transition to a low-carbon society—hydrogeological constraints vs. societal demands

Main Supervisor: **Steffen Birk** [**showcase 2**]
Research field "Meteorology and hydrology: Groundwater resources in climate change"
Research question 2 | Cluster 2
Links to showcases Bednar-Friedl 1, Kirchengast 1, Kirchengast 2, Steiner 1, Maraun 2

Background: Groundwater resources (and more generally the subsurface) are subject to different methods of utilization, which include among others water abstraction for public, industrial, or agricultural purposes, extraction or storage of energy, and construction activities. Changing climate conditions as well as the transition to a low-carbon society may change the interrelation between the different types of usage and thus may create conflicts between them (different from those today). For instance, the transition to a low-carbon society potentially involves enhanced use of hydroelectric power and thus hydraulic structures affecting the stream-aquifer interaction; likewise geothermal energy use or storage depending on the type of technology potentially affects water quantity or quality; more frequent and/or more severe drought may increase the demand for both public water supply and irrigated agriculture. This leads to the following research questions: How will the demands on aquifers change in the transition to a low-carbon society and how can these demands be met using groundwater resources sustainably in a changing climate?

Goal: This thesis aims to assess how the demands on an aquifer system potentially change in the transition to a low-carbon future, and to identify criteria for the sustainable use of groundwater resources in a changing climate.

Methods and disciplinary background: For a selected aquifer system (e.g., in the region of Graz), a groundwater model is developed that accounts for the impacts of various human activities such as water abstraction and hydraulic engineering or other construction activities under current conditions. Different pathways of the future development in the transition to a low-carbon society are explored and implemented in model scenarios to assess how groundwater resources are potentially affected by changing demands (e.g., increased water abstraction for public water supply or irrigation) or related construction activities (e.g., hydraulic structures for hydroelectric power) as well as by changing climate conditions. The results will be used to examine the applicability of the concept of groundwater sustainability (e.g., Alley et al., 1999; Gleeson et al., 2012) under changing environmental conditions.

References:

Alley W. M.; Reilly T. E.; Franke O. L. (1999): Sustainability of ground-water resources, U.S. Geological Survey Circular 1186, 79 p.

Gleeson, T.; Alley, W. M.; Allen, D. M.; Sophocleous, M. A.; Zhou, Y.; Taniguchi, M.; Vandersteen, J. (2012): Towards sustainable groundwater use: Setting long-term goals, backcasting, and managing adaptively. Ground Water, 50 (1): 19–26.