PhD position at KIT in modelling the impact of recent and future drought events on river discharge and fluvial transport sector for the Rhine River

Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT)

KIT is a distinguished research university that combines three core tasks – research, education and innovation – into a single mission. With 9,300 employees and almost 25,000 students, it is one of the largest institutions of research and higher education in natural sciences and engineering in Europe. KIT was awarded the title "University of Excellence" within the German Excellence Strategy launched by the federal and state governments. In the area of Atmospheric Science, KIT was ranked #1 in Germany and #8 worldwide in the 2019 Shanghai Ranking.

The Institute of Meteorology and Climate Research (IMK) participates in the KIT Centers "Climate and Environment" and "MathSEE (Mathematics in Sciences, Engineering, and Economics)" and contributes significantly to the program "Changing Earth" of the Helmholtz Association. The department ‘Troposphere Research’ IMK-TRO (http://www.imk-tro.kit.edu/english/index.php) focuses on troposphere research, climate variability and change, water cycle and trace substance budgets. The Working Group "Regional Climate and Weather Hazards" is supported by the AXA Research Fund (https://axa-research.org/en/project/joaquim-pinto) and focuses on an integrated analysis of extreme weather and climate events, climate change, climate variability and risk assessment. This includes both fundamental and applied research. Particular attention is given to the links between the weather, climate, regionalisation and risk assessment perspectives associated with extreme events. The Center for Disaster Management and Risk Reduction Technology (CEDIM, https://www.cedim.kit.edu/english/3031.php) is a virtual, interdisciplinary research center of KIT in the field of disasters, risks and security. The center develops models and concepts to strengthen security and resilience of a rapidly changing society and environment.

We have an open 3-year position for a doctoral candidate. The position is funded by the CEDIM topic area “Impacts of heat waves and droughts in Germany on society, economy and ecology” with co-funding from the AXA Research Fund. Focussing on the Rhine River, the project targets very rare and not yet observed drought periods (so called black swan events) and their impact on river discharges and fluvial transport sector in a warming world. The PhD project will be co-supervised by Prof. Dr. Joaquim Pinto and Dr. Patrick Ludwig, and supported by the AXA colleagues regarding the impacts perspective.

Duties: As a PhD-Student, you will analyse the impact of long-lasting drought events on the Rhine River discharge and thus its navigability in a warming world using a high-resolution coupled atmosphere-hydrology modelling approach (WRF-hydro). The candidate will conduct own simulations with WRF-hydro to simulate realistic river discharges for past drought events. Based on a 12,000 years data set (LAERTES-EU), the candidate will be able to quantify the statistical representativeness also for extreme return values. The consideration of the LAERTES-EU data as initial and boundary conditions for WRF-hydro simulations will be instrumental to estimate the full range of the discharge also for not yet observed extreme drought conditions for present day climate conditions. In a final step, the candidate will use a pseudo global warming (PGW) approach to assess the possible range of extreme discharges in a warmer climate. PGW experiments will be conducted with e.g., +2K and +4K warmer temperatures to estimate possible changes in return levels of river discharge for drought periods between present day and warmer climate conditions.

Requirements: A master degree in Meteorology, Climate Science, Earth Sciences, or related disciplines. The applicant must be proficient in spoken and written English.
**Additional qualifications:** For this position, previous experience with atmospheric / climate modelling and diagnostics of model data are required. The candidate should also be experienced in scientific programming (e.g., linux, python, fortran, idl, ncl, cdo, Matlab, R) and extreme value statistics.

**The application should contain:**

- A Curriculum Vitae.
- A cover letter stating your scientific interests and what motivates you to apply for this position.
- A list of scientific publications and conferences, if available.
- Contact details (incl. email and telephone number) of two references.

The candidates will be short-listed based on the materials in the application, the top ranked candidates will be interviewed digitally and the references will be collected.

**Salary:** The remuneration is based on the collective agreement of the public service in the remuneration group TVL E13.

**Starting date:** 01-02-2022 or as otherwise agreed.

**Terms and conditions of employment:** The group is based on the research campus of KIT located about 10 km to the North of Karlsruhe city centre.

**Scope of employment:** 75%

For further information about this position please contact: Prof. Dr. Joaquim Pinto, e-mail: joaquim.pinto@kit.edu and Dr. Patrick Ludwig, e-mail: patrick.ludwig@kit.edu

Please submit your application by 03 December 2021 to joaquim.pinto@kit.edu and patrick.ludwig@kit.edu

The documents requested above for the application should be put together and send as a single PDF file.

KIT actively supports equality, diversity and inclusion, and as an equal opportunity employer, KIT explicitly encourages applications from women as well as from all others who will bring additional diversity to the university’s research and teaching. Applicants with disabilities will be preferentially considered if suitably qualified.

Are you considering moving to Germany to work at KIT? If so, you will find a lot of information about working and living in Germany at http://www.intl.kit.edu/ischolar/index.php. You are also welcome to contact the International Scholars & Welcome Office at scholar@intl.kit.edu.