Apply your data science skills to real-world challenges!

At the Helmholtz School for Data Science in Life, Earth and Energy (HDS-LEE), we train the next generation of data scientists to tackle key global issues in domain sciences such as life, earth or energy. Learn more at www.hds-lee.de

In the coming decades, climate change and land use change will have a significant impact on the performance of terrestrial ecosystems in terms of their services (food, feed, fiber, energy) and the challenges facing society. At the Institute of Bio- and Geosciences - Agrosphere (IBG-3), we are developing solutions to secure ecosystem services based on an improved understanding of hydrological and biogeochemical processes in terrestrial systems. Innovative observation technologies are combined with laboratory experiments and modeling to research and predict terrestrial processes across scales (from the pore scale to the field scale to the continental scale), thereby contributing to the sustainable use of natural resources such as water, soil, and the atmosphere.

We are offering an interesting

PhD Position - Earth System Science within the HDS-LEE graduate school

Your Job:

The PhD position is offered in the context of the HDS-LEE graduate school. We are looking for a highly motivated PhD candidate to join our world-leading research program in Earth System modelling and improving Earth System Modeling by better merging of measurement data and model simulations.

This PhD project focuses on improving how we estimate key parameters in land-surface and ecosystem models, which are essential for understanding climate change impacts. The work involves reviewing existing modeling and model–data fusion techniques, and developing faster, machine-learning–based tools that can stand in for slow model simulations. These tools will be used to test how model parameters influence results and to make parameter estimation more efficient. The project will apply and evaluate these new methods at different sites and time periods, compare them with established

The job will be advertised until the position has been successfully filled. You should therefore submit your application as soon as possible. We look forward to receiving your application via our

Online-Recruitment-System!

Questions about the vacancy?

Get in touch with us by using **our contact form.** Please note that for technical reasons we cannot accept applications via email. www.fz-juelich.de

approaches, and finally demonstrate their potential in a Europe-wide ecosystem reanalysis. The outcomes will include open-source software, scientific publications, and a PhD thesis.

Your tasks within framework in detail:

- Conduct a literature review on modern techniques for combining models with observational data, with a focus on innovative parameter-testing and hybrid modelling approaches.
- Gain a solid understanding of land-surface modelling and the land-surface model used in the project.
- Develop simplified, fast-running model surrogates using machine-learning methods to replace very time-intensive simulations.
- Design an efficient training strategy for these machine-learning tools, making use of existing model simulations and actively selecting new simulations where needed.
- Build and test a model "emulator" that can quickly explore how changes in model parameters affect model behaviour, and validate it using independent sites and time periods.
- Use the newly developed tools to estimate key ecosystem and land-surface parameters, and compare the results against existing model–data fusion methods.
- Apply the improved parameter-estimation techniques in a larger-scale setting to demonstrate their potential for ecosystem reanalysis.
- Prepare scientific publications and present results at conferences.
- Publish the developed software openly with documentation.

Your Profile:
- A Masters degree with a strong academic background in mathematics, computer science and earth science/engineering, or a related field
- Proficiency in at least one programming language (Python, Matlab, R, C++, Julia, …)
- Good analytical skills with a sound understanding of data evaluation
- Knowledge of numerical simulation, for example with land surface or hydrological models
- Genuine interest in data science and earth sciences
- Good organizational skills and ability to work both independently and collaboratively
- Effective communication skills and an interest in contributing to a highly international and interdisciplinary team
- Motivation for academic development, supported by bachelor's and master's transcripts and two reference letters
- Working proficiency in English for daily communication and professional contexts.(TOEFL or equivalent or exemption required)
- Knowledge of German is beneficial

Our Offer:
We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! This HDS-LEE PhD position will be located at Forschungszentrum Jülich and RWTH Aachen. We offer ideal conditions for you to complete your doctoral degree:

- Outstanding scientific and technical infrastructure for numerical simulation and inversion
- A highly motivated group as well as an international and interdisciplinary working environment at one of Europe's largest research establishments
- Your working place is at Forschungszentrum Julich (group of Prof. H. Hendricks-Franssen); regular exchange with RWTH Aachen (group of Prof. J. Kowalski) is planned
- Continuous scientific mentoring by your scientific advisors

- PhD students are encouraged to attend international conferences and a three months research stay abroad with a cooperating partner is possible
- Unique HDS-LEE graduate school program (including data science courses, soft skill courses and annual retreats) https://www.hds-lee.de/about/
- Qualification that is highly welcome in industry
- 30 days of annual leave and flexible working arrangements
- Further development of your personal strengths, e.g. via a comprehensive training program; a structured program of continuing education and networking opportunities specifically for doctoral researchers via JuDocS, the Jülich Center for Doctoral Researchers and Supervisors: https://www.fz-juelich.de/judocs
- Targeted services for international employees, e.g. through our International Advisory Service

The position is limited to three years, with a possible one-year extension. Pay is in line with 75% of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) and additionally 60 % of a monthly salary as special payment („Christmas bonus"). The monthly salaries in euro can be found on the BMI website: https://go.fzj.de/bmi.tvoed.entgelt
Further information on doctoral degrees at Forschungszentrum Jülich (including its various branch offices) is available at https://www.fz-juelich.de/en/careers/phd

Further information on the project is available at:
https://www.hds-lee.de/admission/openpositions/

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

The following links provide further information on diversity and equal opportunities: https://go.fzj.de/equality and on specific support options for women: https://go.fzj.de/womens-job-journey