



Conducting research for a changing society: This is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association, we aim to tackle the grand societal challenges of our time and conduct research into the possibilities of a digitized society, a climate-friendly energy system, and a resource-efficient economy. Work together with around 7,500 employees in one of Europe's biggest research centres and help us to shape change!

Understanding biogeochemical and hydrological processes in terrestrial systems is critical to cope with climate and land-use change as key drivers influencing terrestrial environmental systems that will need to be managed by society in the coming decades. At the Institute of Bio- and Geosciences - Agrosphere (IBG-3) and Bioinformatics (IBG-4) we connect process-based and data-driven modeling for understanding, predicting and adapting water, energy and matter exchange processes in the soil-plant-atmosphere continuum with structure-based bioinformatics focusing on understanding, predicting and modulating of the dynamics and interactions of biomolecules. This collaborative interdisciplinary research bridges spatio-temporal scales from molecules to soil-plant systems. It contributes to a fundamental understanding of high-dimensional data and functioning of biomolecules in life sciences and bioeconomy to enable sustainable and resource-conserving use of soils and water under climate and land-use changes in terrestrial ecosystems.

We are offering an interesting

PhD Position - Advancing Root Phenotyping and Soil Function Exploration Through Non-Invasive Agrogeophysics

Your Job:

The PhD project offered will be part of the Cluster of Excellence: PhenoRob - Robotics and Phenotyping for Sustainable Crop Production. PhenoRob performs world-leading research in robotics and phenotyping for sustainable crop production with the vision to transform crop production by optimizing breeding and farming management through developing and deploying new technologies. Within PhenoRob, we develop novel agrogeophysical methods to obtain noninvasive subsoil information that can be used to advance root phenotyping and soil functions. Soil-root interactions will be analyzed across management scenarios using geophysics and numerical modeling.

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

High-resolution subsoil characterization using electromagnetic induction (EMI), and ground penetrating radar (GPR) will be combined with soil sensors systems and UAVs at different scales. In particular, we will combine borehole and surface GPR as well as small-scale EMI measurements with root and shoot observations in controlled experiments (rhizotron facility) and field trials. In addition to field applications, novel inversion algorithms for ground-penetrating radar (GPR) and electromagnetic (EM) will be developed. These algorithms will enable high-resolution, quantitative time-lapse soil property measurements using high-performance, parallel computing. Together with our existing rich dataset, we will inform a soil-plant digital twin, enabling ML-based analysis of geophysical and rover approaches for field-scale root and soil characterization.

You will be part of a dynamic research team applying advanced geophysical methods to study soil-plant interactions. Your main responsibilities will include:

- Developing and applying high-resolution time-lapse GPR and EMI imaging methods at multiple scales to enhance our understanding of the soil-root system
- Designing and implementing novel inversion algorithms for GPR and EMI data
- Identifying links between non-invasive agrogeophysical parameters and the soil-plant continuum
- Improving small-scale process understanding of soil-plant interactions and transferring this knowledge to larger scales for applications in agricultural management
- The project offers the unique opportunity to connect novel processing and inversion techniques to experimental data from different regions and link the findings to relevant processes of the soil-plant system.

For further information visit our website

http://www.fz-juelich.de/ibg/ibg-3/EN/Home/home_node.html or contact us via the contact form.

Your Profile:

- Master's degree in geophysics, physics, geoscience, computational geoscience, or related natural sciences with an overall grade of at least good
- Experience in programming (e.g., matlab, phyton, C/C++)
- Advanced knowledge of numerical methods
- Geophysical fieldwork experience, preferably with GPR and EMI
- Strong English writing skills
- Since the work involves interdisciplinary cooperation with several researchers and technicians, good communication and organizational skills are essential
- Drivers licence is required (or should be obtained within first 3 months)
- Physical work is required

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! We offer ideal conditions for you to complete your doctoral degree:

- Working in an interdisciplinary environment as well as excellent facilities for hydrogeophysical research and numerical simulation and inversion
- Opportunities to being part of the national and international scientific community
- PhD students are encouraged to attend international conferences and a three months research stay abroad with a cooperating partner is possible
- Working in the heart of Europe
- Dynamic and diverse working group and work environment
- Your professional development is important to us – we support you specifically and

individually e.g., through training and networking opportunities specifically for doctoral candidates (JuDocS): <https://go.fzj.de/JuDocs>

- 30 days of annual leave
- Further development of your personal strengths, e.g. through an extensive range of training courses; 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/en/judocs>
- Targeted services for international employees, e.g. through our International Advisory Service

The position is for a fixed term of 4 years. Pay is in line with 70% 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.tvod.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>

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:
<https://go.fzj.de/womens-job-journey>