The Institute of Bio- and Geosciences – Agrosphere (IBG-3) conducts research to improve our understanding of hydrological and biogeochemical processes in terrestrial systems. Its research contributes to the sustainable and resource-conserving use of soils and water.

A sustainable agriculture that is able to fulfill the global demand for more food is an important challenge. Especially in the context of climate change, the need to reduce nitrate losses to the groundwater and greenhouse gas emissions to the atmosphere is essential. Within-field heterogeneity of soil and plant properties such as soil texture and root zone depth but also differences in crop management leads to small-scale patterns of crop performance and differences in crop chlorophyll status. Multispectral sensors on unmanned aerial vehicles (UAV) are able to identify those soil-induced patterns in addition to different nitrogen management regimes. The aim of this study is to develop a detailed and combined soil-plant physiological and radiative transfer model system to describe the water and nitrogen turnover in the soil and in the plant and to forward simulate the resulting radiance spectra of a crop canopy. UAV observations will be used to derive meter-scale state variables to inform and validate the modeling system. In this way, deeper insights in potential remotely sensed observables with respect to soil-plant interactions will be obtained to support the description of drought stress impacts. Additionally, the fertilization status of plants will be determined, which is of use for optimal nitrogen fertilization strategies.

We are offering a

2019D-184 - PhD Position in field-scale crop and soil N modeling

Your Job:

• Refinement of the nitrogen module in the soil-plant physiological model in terms of turnover, leaching and gaseous emissions
• Sensitivity analysis of meter-scale patterns with respect to variations in soil texture, total soil N, soil mineral N concentration and nitrogen management on crop
performance

- UAV-based within-field Observing System Simulation Experiment (OSSE) for plant height, leaf area index and leaf nitrogen concentrations (joint experiment with PhD ‘UAV remote sensing’)
- Field-scale experimental determination of soil and crop status variables and greenhouse gas fluxes
- Setup of the meter-scale DAA in terms of water, solute, energy and gas fluxes
- Contribute to an international research team, publish in international journals and present results at international conferences

Your Profile:

- University degree in either geosciences, computer science, physics or civil engineering
- Knowledge in the areas of hydrology, soil sciences, carbon and nitrogen cycling
- Demonstrated programming skills (Fortran, C++, R, Python)
- Ability to work independently as well as collaboratively in an international, interdisciplinary team across institutes; very good communication and organizational skills
- Very good command of the English language
- Willingness to perform field work

Our Offer:

- Vibrant international and interdisciplinary work environment on an attractive research campus, ideally situated between the cities of Cologne, Düsseldorf, and Aachen
- Attendance at national and international conferences and workshops
- Possibility for further scientific and technical training through international experts
- An exceptional research infrastructure
- Usually a contract for the duration of 3 years
- Pay in line with 70% of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) is offer to attract high-profile candidates

To apply, please submit a complete CV, motivation letter, university degree records (both Bachelor’s and Master’s degree), as well as two reference letters.

Forschungszentrum Jülich aims to employ more women in this area and therefore particularly welcomes applications from women.

We also welcome applications from disabled persons.