

# *The RAL Seminar Series*



**NCAR**

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## **Patterns in Soil-Vegetation-Atmosphere- Systems: Monitoring, Modeling and Data Assimilation**

by

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Foothills Lab Building 2,  
Room 1022, 11:00 a.m.**

The soil-vegetation-atmosphere (SVA) system is characterized by non-linear exchange processes that act across various space and time scales. These processes encompass the transfer of mass, energy and momentum, and are inseparably intertwined resulting in feedbacks and system responses that are difficult to describe, quantify and predict. Despite of the extreme heterogeneity and variability, the natural system exhibits reoccurring spatiotemporal structures and patterns at various scales, which suggest different levels of organization. The central hypothesis of the TR32 is based on the paradigm that characterization of these structures and patterns will lead to a deeper qualitative and quantitative understanding of the SVA system and ultimately to better predictions. In this context, the TR32 specifically focuses on the analysis of moisture and CO<sub>2</sub> fluxes across a large range of space and time scales.

The TR32 constitutes an interdisciplinary collaborative research including the universities of Aachen, Bonn, Cologne and the Research Centre Jülich comprising a broad range of natural scientific disciplines that deal with the SVA system. Rather than studying each compartment by itself, the TR32 connects the different compartments to arrive at a holistic view of the SVA system in order to assess the role of patterns and structures. Research in the TR32 is based on three methodological pillars: monitoring, modeling and data assimilation. These pillars contribute individual and fundamental scientific findings to the paradigm of structures and patterns and are closely interconnected through scientific interdependencies.

Here, I will introduce the organization and scope of the Research Center with an emphasis on measurements, and the development and application of integrated simulation platforms for SVA systems. I will show and discuss results from different project sections that are associated with the different processes and spatial scales of the SVA system ranging from the pore scale to the atmospheric mesoscale. The role of modeling and also data assimilation will be highlighted in the interpretation of the observations with regard to patterns and structures; process understanding; and the classical problem of upscaling.