



RAL SEMINAR SERIES

Advanced Research Programs on Land-Atmosphere Feedbacks and Recent Application

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There is an urgent need to advance the understanding of land-atmosphere (L-A) feedback processes and their representations in Earth system models. This is essential for accurate Earth system analyses and simulations at all spatial and temporal scales. These include weather forecasts, medium to sub-seasonal forecasts and climate projections. L-A feedbacks alter the impacts of land use and land cover changes on regional hydrology, weather, and climate. Furthermore, heat waves and droughts can be intensified by L-A feedbacks, which is particularly critical because extremes are expected to be increased and amplified by climate change. A detailed understanding of L-A feedbacks also provides the basis for a trustworthy analysis of bio-geoengineering and weather modification approaches.

In this presentation, two new projects are introduced that are designed to contribute to these efforts. These are the Collaborative Research Unit 5639 „Land-Atmosphere Feedback Initiative (LAFI)“ of the German Research Foundation (DFG) and the GEWEX Land-Atmosphere Feedback Observatory (GLAFO), a research activity of the GEWEX Global Land-Atmosphere System Studies (GLASS) Panel.

The application of an advanced understanding of L-A feedbacks is demonstrated by the so-called Cloud and Precipitation Reactor (CPR), an EU-patented approach to initiate and intensify precipitation in desert regions. The CPR is based on the modification of the dynamics and thermodynamics in the lower troposphere by land surface modifications. The main design and the resulting impacts of the CPR on cloud and precipitation development over the UAE during summertime is presented and discussed.