

Abstract:

Merging high resolution atmospheric models and observations

Within the SFB/TR 32 „Pattern in Soil-Vegetation-Atmosphere Systems: Monitoring, Modelling, and Data Assimilation“ a multitude of meteorological measurements (eddy-covariance, remote sensing, aircraft measurements...) took place above a patchy, agricultural dominated landscape near Jülich/Germany.

The measurements are aimed to capture the variability of water vapor and CO₂ and their relation to surface characteristics and derive turbulent fluxes in the atmospheric boundary layer close to the ground.

Some high resolution atmospheric models like the FOOT3DK model coupled with a photosynthetic model (100 m) and the COSMO model (400 m) are used to simulate the variability of the turbulent fluxes and the exchange of CO₂ and H₂O between ground and atmosphere.

My goal during PhD study is to get a better understanding of exchange processes between land surface, vegetation and atmosphere. One part of my PhD is the analysis of the aircraft measurements and another part is to validate the models with the aircraft measurements and further observations. For this purpose I use different approaches to validate the COSMO and FOOT3DK simulations. One approach is to compare CO₂ and H₂O budgets of advection and divergence for a domain enclosed by the aircraft measurements and the budgets of the corresponding model grid boxes. Another approach is the direct comparison of spatially and temporally resolved averaged boundary layer parameters like fluxes. Furthermore I generate synthetic „measurements“ from the model data for merging with remote sensing observations like the integrated water vapor measured by microwave radiometers.

Motivation:

The main topic of the spring school is merging models with measurements. This is an important part of my PHD work.

I am very interested to learn more about the statistical methods like Bias estimation and correction and the estimation of uncertainties when validating model data with observations.