APPROACHES TO FOOTPRINT MODEL VALIDATION BASED ON NATURAL TRACERS

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Footprint models have become an important and widely accepted tool for the determination of the spatial context of micrometeorological measurements. Knowledge about the source area of an instrument is useful for both selecting suitable experiment sites, and for performing post-field data quality control to interpret the measurements correctly. Many different footprint models with a varying level of sophistication have been developed during the last decade, most of them either implemented as analytic or Lagrangian stochastic algorithms. A comparison of these models is necessary to highlight differences between them, and to validate their accuracy.
The footprint models to be compared in the study presented are the analytic flux source area model (FSAM) by SCHMID (1994, 1997) and the THOMSON (1987) Lagrangian stochastic trajectory model as parameterised by RANNIK et al. (2003). Several approaches to compare these algorithms on the basis of field scale micrometeorological measurements of energy exchange and trace gas fluxes between surface and atmosphere were performed. The natural tracers employed are momentum flux, sensible heat flux, and CO2 flux. The experiments comprise parallel measurements of several eddy-covariance towers with different fetches, line source measurements with scintillometers above varying land use forms, and a footprint based comparison of an eddy-covariance system with soil chamber measurements.