



Eddy covariance flux measurements of the NO-NO₂-O₃ triad over a mixed deciduous forest in a moderately polluted environment - quality assessment of fluxes and footprint analysis

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In 2002 and 2003, two large-scale field experiments were conducted in a deciduous forest at Juelich (Germany) within the framework of AFO2000-ECHO (Emission and CHEmical Transformation of biogenic volatile ORganic compounds). Surface exchange fluxes of momentum, sensible heat, H₂O, CO₂, and reactive trace gases O₃, NO and NO₂ have been measured by eddy covariance (EC) techniques at 30 m on the ECHO-"westtower".

The Juelich forest ecosystem is characterized by (a) predominance of oaks/birches in the western and beeches in the eastern part of the footprint area, (b) its very limited extent and (c) close vicinity to different anthropogenic sources. These features substantially complicate the interpretation of EC-fluxes, which are theoretically based on the assumptions of steady-state flow conditions, horizontal homogeneity and the absence of advection.

We present results of a detailed quality assessment of our EC-flux data and extensive footprint analyses. Quality assessment is achieved by applying well-established criteria (e.g. tests on integral turbulence characteristics and steady-state conditions) and investigations on characteristic cospectral features. Footprints of EC-fluxes are calculated using two different footprint models, an analytic approach and a forward Lagrangian stochastic trajectory model.