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A scintillometer variance approach to measure vertical scalar fluxes

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Standard flux-profile methods to measure scalars fluxes often meet serious problem of instrumental and theoretical nature. This is due the fact that vertical profiles are not easy to measure and, moreover, several studies revealed violation of 'standard' flux-profile relations. The latter might be caused by the fact that sinks and source at the surface are different for different scalars or by non-local effects such as influence of entrainment. Eddy correlation techniques meet problems also. In the last decades, several studies were devoted to the flux-variance method. In short, this approach can be summarized by a flux of scalar x and the 'relevant' velocity scale. The latter is linked to turbulence transfer mechanisms. In the standard variance method the 'relevant'velocity scale can be evaluated from the measured standard deviation of temperature and the wind speed at a single level.

In this study it is proposed to evaluate Urel from the output parameters of a displaced-beam laser scintillometer, manufactured by Scintec, Germany. Results will be shown for H2O and CO2 fluxes using data gathered on different locations under both stable and unstable conditions.