



## Daily boundary layer budget estimates of carbon dioxide using tall tower data

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The boundary layer budget method (BLBM) has been applied in several previous studies to estimate surface-atmosphere water and carbon dioxide fluxes at regional scale using different data sources and different approximations and simplifications of the budget equation. Typical application of the technique was restricted to only a few days, or alternatively monthly average mixing ratios were used to estimate surface fluxes. We present an alternative approach for the budget estimates. Using routinely available meteorological and ancillary data we tested the applicability of the method and its sensitivity on the input data for several months in daily timestep. Tall tower carbon dioxide mixing ratio data from the Hungarian greenhouse gas monitoring site (Hegyhátsál; 46°57'N, 16°39'E, 248 m ASL) is used as the main input data for the model, and collocated regional scale CO<sub>2</sub> net ecosystem exchange measurements is used as reference. The results show that the applicability of the BLBM is severely restricted during non-ideal meteorological conditions. However, excellent results might be obtained during ideal (i.e. non-advective) conditions. The BLB technique is very sensitive to the errors in the measurements and input data, since the sought flux is the small difference between the large terms. Although, the contribution of the subsidence term is small compared to the change in CO<sub>2</sub> content in the boundary layer it plays an important role in the results. The results agree better with the tower measurements during the growing season, while during the dormant period the differences between the measured and modelled values are more pronounced.