



## **The CarboEurope-IP advection activities ADVEX'05: A joint effort to improve experimental and methodological approaches of CO<sub>2</sub> advection measurements**

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During night conditions, direct measurement of the CO<sub>2</sub> balance terms requires to set up a suitable experimental design in order to measure all the needed variables simultaneously and as accurately as possible. In contrary to previous and recent advection experiments, where horizontal CO<sub>2</sub> concentration gradient measurements were mainly performed in a 2D line setup, the extensive experimental activities of the CarboEurope-IP advection group take into account the 3D aspect of the problem. From May to September 2005 a flux tower with a standard eddy covariance system, situated at the CarboEurope site in Renon (Italian Alps), was completed with a setup constituted by four additional 30 m towers equipped so as to capture vertical profiles of wind velocities, [CO<sub>2</sub>] and temperature as well as horizontal [CO<sub>2</sub>] and tempera-

ture transects. It was used in order to evaluate the exchange processes of CO<sub>2</sub> in the soil-vegetation-atmosphere control volume with a high spatial resolution.

One of the main goals of these activities is to improve our understanding of the processes responsible for the underestimation of night time CO<sub>2</sub>-fluxes and to provide an alternative to the classical  $u_*$ -correction, which is currently the standard method used in the flux community to overcome the problem. The results of the ADVEX'05 campaign are analysed in order to quantify the horizontal and vertical non turbulent advective CO<sub>2</sub>-fluxes during night time. The behaviour of these fluxes is analysed in relation to synoptic conditions and their importance compared to  $u_*$ -corrected estimations of the carbon balance. The main methodological problems like horizontal and vertical integration of the measurements in a 3D control volume and the estimation of the “true” vertical wind component are also addressed considering experimental data.