



Influence of mesoscale transport processes of CO₂ on flux measurements at complex terrain

C. Rebmann (1), O. Kolle (1), W. Kutsch (1), M. Zeri (1), C. Feigenwinter (2)
Max Planck Institute for Biogeochemistry, Jena, Germany (crebmann@bgc-jena.mpg.de)

Eddy covariance measurements are performed at the Wetzstein site in Thuringia, Germany since 2002. As many other sites in the CarboEurope framework, this spruce forest site is not an ideal flux site because of the complicated or even complex orography. This became obvious through apparently non-realistic high night-time fluxes of CO₂ under specific circumstances. To deal with these shortcomings, a number of additional measurements are currently performed at the site. The site was also selected for the advection experiment ADVEX as part of CarboEurope-IP. For more than 2 months in spring 2006 four additional towers were equipped with profile measurements for CO₂-concentrations and wind components to determine advective processes. Additional flux measurements were performed on one of the ADVEX towers and on 2 towers at the slopes of the ridge for the main wind directions. It could be seen already that wind direction and atmospheric stability have a strong influence on the difference of fluxes measured at nearby locations even though the vegetation itself is more or less homogenous. The presentation will focus on CO₂-flux and -concentration measurements along a transect across the ridge of the Wetzstein site. Preliminary analyses have shown that CO₂ is often accumulated in the surrounding valleys during night-time and then transported upslope and measured as high respiration by the main tower flux system. The net ecosystem uptake measured at the slope tower is larger than at the main tower and will therefore compare better with inventory data. After careful analyses a set of selected data can be used from the main tower to determine annual sums of the net carbon exchange of the site. But we conclude that measurements from the slope tower are most probably more representative for this spruce ecosystem as data can be treated in a more common way.